DIFFERENTIAL EFFECTS OF ATTENTION IN SECOND LANGUAGE ACQUISITION OF VERB-NOUN COLLOCATIONS

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ABSTRACT

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This study aims to investigate how the acquisition of a verb's collocational features is influenced by different levels of attention and whether the effect of attention is mediated by collocational complexity and proficiency level. Four levels of attention were studied: (1) *semantic processing*: learners were only asked to understand passages with the target collocations embedded; (2) *memorization for recall*: learners were instructed to memorize the target collocations in the passages for a later recall test; (3) *rule given*: learners were provided with the target collocational rules and studied how the rules applied to the instances in the passages; (4) *rule given plus negative evidence*: learners were provided with the target rules, studied how they applied to the instances in the passages; moreover, they were informed of what were impossible noun collocates for the target verbs.

94 Mandarin speakers enrolled in English 2nd- and 4th-level courses in a university in China participated in the research. The target learning items were four partially artificial English verbs, which displayed two degrees of collocational complexity. Within

each proficiency level, participants were randomly assigned to one of the four attentional conditions as specified above and received a three-day treatment. On the fourth day, all the participants did a test that consisted of three parts: (1) determining the basic meaning of the target verbs; (2) writing down as many noun collocates as possible for the target verbs; (3) judging whether a sentence containing one of the target verbs was good or not.

The results indicated that, overall, learners in the two rule-oriented conditions (3 and 4) excelled in various parts of the test: recall of phrases that appeared in the passages, production of new collocates for the target verbs, and judgment of bad collocations. Learners under the *memorization for recall* condition demonstrated certain advantages in storing old phrases, but not in other areas. The *semantic processing* condition turned out to be the least efficient for learning L2 collocations. Moreover, it was found that negative evidence in L2 collocations could help to reduce overgeneralization errors. This study was not able to detect an interaction between attention and collocational complexity, but an interaction between attention and proficiency level did emerge. The *memorization for recall* and *rule given plus negative evidence* conditions were less effective with Level 2 learners than with Level 4 learners. And this differential effect of attention was accounted for in terms of learners' processing features and capacity.

Dedicated to Yu

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Chapter 1

Introduction

1.1. Background

Acquisition of L2 vocabulary is a gradual and incremental process of learning several different knowledge components. According to Nation (2001), there are nine aspects of what is involved in knowing a word: spoken form, written form, word parts, form and meaning, concept and referents, associations, grammatical functions, collocations and constraints on use. Among these parts, one of the most notoriously problematic for L2 learners is collocations, that is, knowledge about what words or types of words occur with a particular word, for instance, the knowledge that the typical noun collocates of the adjective *underdeveloped* are words like *territories* and *areas* (more below on the term *collocation*).

Recognition of L2 learners' collocational deficit can be traced back at least to the 1930s. Palmer (1933) listed a selection of verb-noun combinations (e.g., *ask a question, do a favour, give trouble, have patience*) and pointed out: "While these are fairly regular they show the learner (what sooner or later in the course of his study he must come to know) that this particular verb may be followed by this particular object ... Without such information the learners tends to form such combinations by guess work or on the analogy of his mother tongue, and we can imagine him coming up with such unusual expressions as '*to make a question, to perform a favor, to do trouble, to keep patience...*'" (p. 8). A similar point was made by Pawley and Syder (1983): "It is a characteristic error of the language learner to assume that an element in [a linguistic] expression may be varied according to a phrase structure or transformational rule of some generality, when in fact the variation (if any) is much more restricted"(p. 215).

Bahns and Eldaw (1993) used cloze and translation exercises to test the productive knowledge of English verb-noun collocations among German EFL learners (e.g., *keep a diary, take a call, pay compliments*). The obtained data showed that collocational competence did not develop at the same rate as the knowledge of vocabulary in general. Similar conclusion can also be drawn from the research by Arnaud and Savignon (1997), who compared the vocabulary knowledge of French advanced learners of English with that of native speakers (NSs) of English through a word checklist test and a multiple-choice test. The learners were found to be able to attain nativelike performance with rare low-frequency words, but not with complex lexical units, which included noun phrase (e.g., *a damp squib*), verb equivalent (e.g., *make no bones about*), adverbial or prepositional phrase (e.g., *at a pinch*), etc.

Marton (1977) looked at both production and comprehension data. It was reported that although L2 learners of English could comprehend and translate certain phrases in English, they could not thereafter produce them. Granger (1998) asked 56 French speakers of English to choose, from a list of 15 adjectives in each case, the acceptable collocates of 11 amplifiers (e.g., *readily available, bitterly cold*) and also to mark it with an asterisk if they felt one adjective was more frequently associated with the amplifier than all the others. Learners' answers indicated that their sense of frequency in L2 collocations was weak and partly misguided.

To sum up, there has been general recognition of the problems facing learners in achieving native-like selection of collocations. The problems, which are interrelated with each other, mainly include: (1) overgeneralizing a word's possible collocates; (2) discrepancy between comprehension and production; (3) poor or wrong sense of frequency; (4) slow progress in this area.

1.2. Purpose and significance of this study

Why is the development of L2 collocational competence so difficult for learners? How do learners acquire a word's collocational features? This study aims to provide some answers by looking at the initial stages in learning L2 collocations and examining how the learning is influenced by different levels of attention, one of the most important factors determining what in the input will be noticed and become assimilated into the interlanguage (IL) system (Gass, 1988a, 1997; Schmidt, 1990, 2001).

The target items in the current study are verb-noun phrases. This subset of collocation is chosen because from a writer's point of view they represent the proposition core of a fully formed sentence and additionally they can provide the closest point of contact with other published studies on the acquisition of L2 collocations.

The research questions of this study can be briefly summarized as follows:

RQ1: Which of the following attentional conditions leads to the best gains in learning a verb's possible noun collocates (in all conditions, learners were asked to understand the passages containing the target collocations): (1) attention directed towards irrelevant parts; (2) instructed to memorize the target collocations for a later recall test; (3) provided with the collocational rules underlying the target items and studying how the rules work in the passages; (4) provided with the collocational rules underlying the target items, studying how the rules work in the passages, and also provided with negative evidence (NE), that is, what are impossible collocates for the target words?

RQ2: Is the effect of the four attentional conditions mediated by complexity of collocational patterns?

RQ3: Does attention have differential effects on different proficiency levels?

The answers to these questions can contribute to second language acquisition (SLA) research in two ways. First, previous research on learning L2 collocations has been focusing on identifying the errors in IL production and analyzing the causes There have been very few studies that directly examine the dynamic learning process, that is, how learners' knowledge of a particular word develops from complete unfamiliarity, through recognition of the word and some idea of its meaning, to knowledge of its collocational features. This study aims to fill in this gap and throw light on some of the unexplored problems. Second, this study can enhance our understanding of the role of attention in SLA. There are still controversy and uncertainties over which level of attention is required for L2 learning and how attention interacts with language area and proficiency level. Moreover, previous research on attention is limited to the learning of syntax, morphology and basic word meaning. Since collocational knowledge is viewed as the essence of all fluent and appropriate language use (e.g., N. Ellis, 2001; Pawley & Syder, 1983), we cannot have a thorough understanding of the role of attention in SLA without exploring its effect in learning collocations.

CHAPTER 2

Literature review

In this chapter, I will first provide a description of the two crucial terms in the title of this research, that is, *collocation* and *attention*. On the basis of this description, I will then proceed to review previous literature on acquisition of L1 and L2 collocations, some of which is related to the issue of attention. Although this study only focuses on verb-noun phrases, my review about collocation and its acquisition is not limited to this category, because I consider all types of collocations as essentially the same in the sense that they are all about word sequences. Finally, I will look at the most widely investigated and discussed issues concerning the role of attention in SLA, which have inspired the current study. These issues include: (1) attention in learning L2 syntax and morphology; (2) attention in learning L2 word meaning; (3) attention and different aspects of language; (4) attention and proficiency levels; (5) the role of NE.

2.1. The nature of collocations

Collocation is a term that has been used and understood in different ways. Some researchers restricted it to an idiom whose meaning is not obvious from its components, like *blow the gaff* (e.g., Palmer, 1933); some used it to refer to a phrase in which a word is used in a specialized sense only found in the context of certain types of words, like *blow a fuse* (e.g., Bahns & Eldaw, 1993). This study adopts a broad notion of *collocation*, which is defined as "the co-occurrence of two or more lexical items as realizations of structural elements within a given syntactic pattern" (Cowie, 1978, p.132). In other words, the term collocation is used to describe any generally accepted grouping of words into phrases or clauses, for example, *compose music, begin to, as it were* (see Howarth, 1998; Moon, 1997; Nation, 2001 for a similar approach). In this broad sense, collocations can occur in a variety of forms and with a variety of relationships between the words that make up them. I will first review two major dimensions that have been proposed to classify collocations, and then discuss the rules underlying the collocational phenomenon and the significance of collocations in natural language use.

2.1.1. Types of collocations

2.1.1.1. Grammatical and lexical collocations

Following Benson, Benson, and Ilson (1986), collocations fall into two categories: grammatical collocations and lexical collocations.

A grammatical collocation generally consists of a dominant open class word (noun, adjective or verb) and a preposition or particular structural pattern such as an infinitive or a clause. The major types of grammatical collocations are: (1) noun + preposition/ *to* infinitive/ *that* clause (e.g., *access to, pleasure to, agreement that*...); (2) preposition +

noun (e.g., *in advance, to somebody's advantage*); (3) adjective + preposition /*to* infinitive/ *that* clause (e.g., *aware of, necessary to, afraid that...*); (4) a verb combining in different ways with a preposition, an infinitive with *to*, an infinitive without *to*, a verb form in *-ing, that* clause, an interrogative word, etc. (e.g., *adjust to, begin to, keep doing, think that..., ask why...*).

A lexical collocation, on the other hand, normally does not contain infinitives or clauses. It typically consists of open class words (noun, adjective, verb or adverb). Six major types have been identified by Benson et al.: (1) verb + noun/pronoun/prepositional phrase (e.g., *compose music, perform a task, draw up a bill*); (2) adjective + noun (e.g., *slight decline, rough estimate*); (3) noun + verb (e.g., *The economy (is) booming. Bees buzz.*); (4) noun + noun (e.g., *a bunch of flowers, a swarm of bees*); (5) adverb + adjective (e.g., *deeply grateful, sound asleep*); (6) verb + adverb (e.g., *increase dramatically, appreciate sincerely*).

2.1.1.2. Free collocations, restricted collocations and idioms

Another way to classify collocations is to set up a continuum -- free collocation, restricted collocation and idiom (figurative idiom and pure idiom), which is derived from using criteria like restricted collocability, semantic specialization, and idiomaticity (see Aisenstadt, 1981; Arnold, 1986; Howarth, 1998). It has to be noted that each of the criteria is gradable, so there is no clear-cut borderline between the categories (Howarth, 1996). Table 1 presents some examples for each category.

Table 1 Collocational continuum

	free collocation	restricted collocation	figurative idiom	pure idiom
lexical collocation	*make a cake, forge a blade*	*make a suggestion, forge unity*	*blow your own trumpet*	*have a chip on one's shoulder*
grammatical collocation	*under the desk, on the wall*	*under attack, on the increase*	*under the micro-scope*	*under the weather*

Free collocations, also referred to as open collocations or free combinations, are made up of elements used in their literal sense. The constituent words are not bound specifically to each other and they occur freely with many other semantically compatible lexical items. For example, *buy a book (TV, piano, car...), in the suitcase (room, house, box...).*

On the other end of the continuum is the most opaque and fixed set: figurative and pure idioms. A figurative idiom has a metaphorical meaning in terms of the whole and a current literal interpretation (e.g., *blow your own trumpet*). A pure idiom has a meaning that cannot be determined from the meanings of the components and it does not have a reasonable literal meaning (e.g., *have a chip on one's shoulder*).

In the middle of the collocational continuum category is restricted collocations, which has one component, usually called a *node* word (Stubbs, 1995), used in a specialized sense and accompanied only by certain types of collocates. Three major types of cases can be identified for restricted collocations:

First, some words have a very narrow and specific meaning, so they occur almost entirely in the company of one or two other words, or a narrow set of words. For instance, the adjective *blond* normally occurs with the noun *hair*, or a noun referring to something made of hair (e.g., *locks*, *wig*) or some entity with hair (e.g., *student*, *doll*). According to Allerton (1984), this limitation of possible collocates is caused by the fact that *blond* has a primary meaning of "light yellow-coloured" and also a secondary meaning of "as applied to hair". In other words, it is part of the meaning of *blond* that it applies to hair. In certain extreme cases, the secondary meaning of a word is so limiting that in typical use, it only displays one or two collocational patterns, for instance, ***torrential*** *rain*, ***cauterize*** *wound*, ***shrug*** *shoulders*, ***curry*** *favor*.

Second, sometimes a word is used in its metaphoric sense, so its possible collocates are limited to certain lexical items or sets rather than all the items that are semantically compatible with the word's basic meaning. For example, the literal sense of the verb *germinate* is "to cause a seed to start growing". In its metaphoric use, the notion drawn from the concrete and tangible domain of plant (the source domain) is used to depict a more abstract target domain (e.g., *hope/mistrust/a good idea + germinate*). Although there are many other things that can start developing, the target domain in this case is typically related to something in one's mind (see *Collins Cobuild English Dictionary,* 1995).

Third, when a word is used in its delexical sense, the range of its possible collocates seems to be delimited for no good semantic reasons. Delexicalisation is the tendency of a word, especially a verb, to lose its original meaning and become lexically "not full" when it is used in conjunction with certain other words (Allerton, 1984; Carter & McCarthy, 1988, p153). For instance, in *have a shower*, the general meaning of the verb *have*, such as "to possess, to receive, to hold", is dropped, and the meaning of the phrase falls upon the noun *shower*. Verbs often considered delexicalised include *give, have, make, take, do, hold, keep* and *set,* all of which are of high frequency, and the first four are the most common ones used in this way (Sinclair & Fox, 1990). Because a delexical verb is somewhat semantically bleached, sometimes there seems to be no obvious reason why certain nouns are eligible as its collocates but some not. For instance, why can we say *give a smile/ cry/ hug/ promise*, but not **give a look/ question*? (There are more discussions about this issue in 2.1.2.) Words of medium frequency may also be used in this secondary and abstract sense, in which case again the range of the collocates is determined by a level beyond semantic compatibility. For example, we may *pay attention*

/a call/ respects/compliments, but not **pay greeting/welcome.*

In short, a restricted collocation has one component used in a special sense (a very narrow, metaphorical, or delexical sense), which causes its collocates to be limited to certain types of words or even several words.

2.1.1.3. Summary of the types of collocations

As demonstrated above, in its broad sense, collocations cover a very wide range of phenomenon. This is best reflected in Nation's (2001) identification of three points along a scale of collocation: "At one end we have idioms like *a red herring, you're telling me* and *be that as it may* which are largely fossilized and opaque. In the middle we have groups like *take medicine, for example* and *little did x know* which allow some substitution, are sometimes grammatically unique, are not necessarily adjacent and are at least partially transparent. At the other end we have items like *as a result, it is assumed that, Where was I?* which are grammatically well-formed, allow a lot of substitution and grammatical change, and are transparent"(p. 335).

2.1.2. Collocations and rules

One level of restriction on the co-occurrence of words is the syntactic level, which can be captured by rules. Then how about the other levels of restrictions? To what extent are these restrictions governed by rules? In a paper on English multi-word items, Moon

(1997) claimed: "Just as a syntactic view of language observes rules underpinning grammatically well-formed utterances, a collocationist view of language observes the strong patterning in the co-occurrence of words. This itself can be seen to some extent as rule-governed and motivated (that is, it reflects some subliminal or underlying system or process of analogy), however prolific the rules are and difficult to codify" (p.42). In Doughty and Williams (1998), lexical item was categorised as *form*, but collocation was categorized as *rule* like devoicing, agreement, etc. In this part, I am going to discuss, on the basis of previous literature, to what extent collocations (free collocations, restricted collocations and idioms) are governed by non-syntactic rules (simply called *rule* in the following discussions). The examples that will be used are all verb-noun phrases, since they are the items targeted in the current experiment, but the analysis also applies to other types of collocations.

For free collocations, the rule underlying the combination is the mutual semantic compatibility of its constituent words. As Allerton (1984) put it, " Individual words are only combined when the ideas they express come together at some point in the physical and/or mental experience of the speaker" (pp. 20- 21). For example, we may say that *resemble* has no selectional restrictions whatsoever on its following noun, but *indulge* is more restricted in that it requires a subject with the feature [+human], except in fairy tales or other creative work.

For idioms, synchronically speaking, the word selection is purely arbitrary (Allerton, 1984). Although there are some attempts to categorize and describe them, the mismatch between the actual meaning and the summed meanings of the constituents seems to be a great challenge to the rule-based view of language (Cornell, 1999). In other words, due to the semantic opaqueness and complete frozenness of an idiom, it is very hard to find any systematic rule on this ostensibly unruly world.

As to restricted collocations, the situation is quite complex. Sometimes, the collocates of the node word can be defined in terms of semantic feature or semantic field (see Stubbs, 1995). For instance, in its metaphoric use, *warp* often takes a noun related to one's mind: *personality, judgment, etc.*; *Forge,* in its metaphoric use, often co-occurs with nouns from the semantic field of "relationship": *friendship, unity, bond, link, alliance,* etc. (see *Collins Cobuild English Dictionary,* 1995).

However, there are three factors that make things more complicated.

First, a collocational rule might be probabilistic and there are some seemingly arbitrary gaps in the patterns. For example, one might state that *commit* is often accompanied by a noun with the semantic feature of "bad or illegal", like *crime, sin, offence, murder, suicide* (Stubbs, 1995). However, it is odd to say **commit* *treachery/burglary/theft*, although these nouns also fit the "bad or illegal" category.

Second, for a collocationally active word, the rules underlying word co-occurrence might be numerous and seemingly unrelated. For example, in its delexical use, *take* can be collocated with nouns or noun phrases (1) that refer to physical actions (e.g., *look, step, shower, breath*), (2) that refer to a time when you are not working (e.g., *holiday, break, the day off*), (3) that refer to an attitude or opinion that you have or are expressing (e.g., *interest, offence, a foolish attitude*), (4) that refer to formal declarations (e.g., *oath, vow*)... (see *Collins Cobuild English Dictionary*, 1995). Learners need to associate these unrelated sets of nouns with the same node verb and also avoid overgeneralizations. This is obviously a difficult task.

Third, on some occasions it seems hard to codify a rule. One example is the choice of delexical verbs. As pointed out by Allerton (1984), the contrast among delexical verbs is somewhat neutralized because they have lost their own distinctive meaning; as a result, sometimes there seems to be no good reason why a particular delexical verb is preferred to another and the choice is partly arbitrary. For example, why do we have to say ***put** a question,* but ***give** an answer*? What is the rule regulating the choice between *put* and *give*? Although it is usually possible to find a semantic justification for this preference (for example, as suggested by Allerton, the answerer of a question is performing a service to the questioner by answering, so *give* is preferred; whereas a question involves placing an utterance in front of the listener for his/her attention, so *put* is used), "it would usually also have been possible to devise a rationale for some other item" (Allerton, 1984, p.33).

In conclusion, at this point, we can only say that collocation is a system that is partly governed by rules, which might be probabilistic and numerous. Sometimes the language simply seems to dictate that such-and-such a combination is or is not acceptable, which is at best only partly explicable in semantic terms.

2.1.3. Significance of collocational knowledge

The Chomskyan view of language posits that linguistic competence is basically an autonomous syntactic component that is capable of generating all the grammatical sentences of a language. However, with the rapid development of large corpora of texts together with increasingly sophisticated text analytic software, it is becoming more and more clear that NSs do no exercise the creative potential of syntactic rules to the full extent, and words display strong clustering tendencies and intricate links with each other. For instance, in *the Bank of English*, a collection of over 300 million words of written and transcribed oral English texts, the adjective *torrential* collocates with *rain* in 99% of the instances, and much less often with a semantically related word such as *downpour* or *storm* (Moon, 1997).

Sinclair (1987, pp. 319-325; 1991, pp. 110-115), who directed the COBUILD project, proposed two principles to account for the structural patterning of lexis: *the open choice principle* and *the idiom principle.* The open choice principle assumes that language is a result of many complex choices where the only constraint is syntactic well-formedness. However, according to the idiom principle, language users have available to them a large number of memorized or semi-preconstructed phrases that constitute single choices and there are constraints and limitations beyond grammaticalness. Sinclair further argued that most of the text is interpretable by the idiom principle and it is the idiom principle that takes precedence. As to the open-choice analysis, it could be "imagined as an analytic process which goes on in principle all the time, but whose results are only intermittently called for" (1991, p. 114). In other words, language use is not as open-class as is supposed with generative grammar.

Besides Sinclair, there are many other researchers who view collocational knowledge as the basis of language use. Becker (1975) claimed, " We speak mostly by stitching together swatches of text that we have heard before; productive processes have the secondary role of adapting the old phrases to the new situations". Zernick and Dyer (1987) proposed a "phrasal approach", which incorporates into the lexicon both individual words and entire phrases like *at noon/midnight/five o'clock, look/sniff/laugh at.*

According to Pawley and Syder (1983), the best explanation for nativelike selection and nativelike fluency (i.e., selecting the most appropriate way to express certain ideas from a variety of possibilities created by syntax and producing language fluently) is that the user's mind is stored with familiar collocations, which express a wide range of familiar concepts and speech acts. By retrieving these collocations as wholes or as "automatic chains" from the long-term memory (LTM), the user "minimizes the amount of clause-internal encoding work to be done and frees himself to attend to other tasks in talk-exchange, including the planning of larger units of discourse" (p.192). Similarly, Cowie (1994) stated that "native-like proficiency of a language depends crucially on knowledge of a stock of prefabricated units" (p. 3168), that is, units assembled to be wholes.

To sum up, the collocational level of linguistic analysis shows that language production is not a process solely governed by syntactic rules; instead, the storage of collocations and the knowledge of the general sequential probabilities of words play a significant role in appropriate and fluent language use. Then how is the complex collocational system acquired? What is the role of attention in the process? I will now move to a review of the second crucial term in the title of this research, that is, *attention*.

2.2. Basic features of attention

People are constantly exposed to large amounts of sensory and cognitive information. It is our attentional mechanism that controls and reduces the input. According to Sergeant (1996) and Sanders (1998), attention operates at three stages of information processing: (1) taking in and processing auditory and visual stimuli; (2) executing central control and making decision, for example, allocating attention to competing task demands; (3) making response and monitoring through sustained attention. These stages correspond to three uses of the concept of attention: (1) attention as selection of the information to be processed and stored in memory; (2) attention as capacity for dealing with information; (3) attention as efforts or energy made to process input and produce output (Robinson, 2003).

There are three critical features of attention that are most relevant to this study:

First, attention is a limited mental resource. Kahneman (1973) described attention as a single finite pool of resources, in which information competes for limited resources. Wickens (1984, 1989, 1992) expanded Kahneman's view and proposed multiple, separate pools of resources (e.g., visual, auditory, vocal, manual), which can be allocated to tasks somewhat independently of one another. According to the multiple-source approach, it is easier to simultaneously carry out attention-demanding activities of different modalities than those of the same modality. In other words, there is some flexibility to the capacity limitations of attention and resources compete within but not between separate attentional pools.

Second, attention is selective. Broadbent (1958, 1971) assumed that specific stimuli must be selected from the incoming information early because attention is a system of limited capacity. However, under the multiple-source model of attention, selection is a result of meeting task demands rather than capacity limitation and it takes place after stimuli have been fully analysed (Allport, 1987).

Third, attention is not a unitary phenomenon. Farah (1992) posited that the activation of attention has a graded property and information represented in neural networks may be "partially represented" (p.40). Cowan (1995) also claimed that we must theoretically be able to speak of the possibility of graded amounts of awareness and attention (p. 200). Posner and Petersen (1990) decomposed the human attentional system into three separate yet interrelated networks: *alertness*, *orientation*, and *detection*. Alertness is general readiness to deal with incoming information; orientation is to allocate attention towards some types of sensory stimuli while excluding others; detection is the process of selecting or cognitively registering a specific bit of information with or without awareness. According to Posner and Petersen, alertness can work independently or modulate orientation, and orientation makes detection more likely but does not guarantee it. This analysis of attention implies that the activation of attention is a continuum, which can range from alertness to orientation, to detection outside awareness and to detection with awareness. Robinson (2003) described the following stages of information processing, which differentiated peripheral attention with focal attention. First, sensory information is detected through peripheral attention and held temporarily in the sensory register. Then, certain stimuli are further selected by focal attention, where two types of rehearsal processes operate: maintenance rehearsal and elaborative rehearsal. Maintenance rehearsal refers to cycling certain representations in short-term memory (STM) through a "phonological loop" (Baddeley, 1986) and it can lead to the storage of the representations in an unanalyzed form in LTM. Elaborative rehearsal is a more effortful learning process, in which the learner may attempt to find a rule by consciously retrieving old instances and comparing them with the present input, or test a previously formed hypothesis.

In the process of learning L2, learners are exposed to influx of input, and it is attention that sorts out the information and brings order to it. According to cognitive accounts of SLA, L2 development is mostly driven by what learners pay attention to in the input. The allocation of attention is claimed to be a necessary condition for selecting items from the input, keeping it active in working and STM, encoding it into LTM and also retrieving it from LTM (e.g., Long, 1996; Schmidt, 1994). It also allows learners to notice a gap between their IL and the target language (TL), or a gap between what they can produce and what they need to produce, both of which are considered as crucial for triggering changes in the IL system (Gass, 1988a, 1997).

Although it is generally agreed that some kind of attentional process is required for input to initiate development in the IL system, opinions vary as to the amount and type of attention that are necessary for the acquisition of certain L2 items. Which level of attention is necessary for acquisition to take place, focal attention or detection that requires minimally low levels of peripheral attention? What are the differential effects of attention on different language items and on learner proficiency levels? These questions have stimulated a lot of debate and discussions in the field of SLA, mostly focusing on the area of learning L2 syntax and morphology. Before reviewing these discussions, which have motivated the research questions of the current study, I will first provide an overview of previous research on how individuals acquire L1 and L2 collocations, some of which is related to the issue of attention.

2.3. Acquisition of L1 collocations

As suggested in 2.1, text and corpus studies have revealed the significance of collocations as basic, intermediary units between the levels of lexis and grammar. There are certain collocational constraints that learners must adhere to. How do people develop the collocational competence in L1? According to N. Ellis (1997), this is predominantly an automatic and implicit process of analyzing word sequence and frequency information, like learning phonotactics. This section will first consider some of the basic issues about implicit learning and then look at how the mechanisms of implicit learning operate in L1 collocation acquisition.

2.3.1. Implicit learning

The theory of implicit learning is largely formulated on the basis of three types of empirical experiments within the field of cognitive psychology.

The first type is the learning of artificial grammars. Subjects were exposed to strings of letters that were generated by a grammar or rule system (e.g., MXRMXT, VMTRRR) and instructed to memorise the examples for a later memory test. It was found that after the treatment subjects could make correct judgment about whether NEW strings conformed to the underlying grammar or not at above chance levels although they were generally unable to verbalise the corresponding rules (e.g., Reber, 1967, 1976; Reber, Kassin, Lewis & Cantor, 1980).

The second type of experiments is sequence learning in which subjects were exposed to long symbol strings that displayed recurrent patterns and then asked to predict future sequence. It turned out that subjects were sensitive to the patterns and could make right prediction, but again they could not verbalise the patterns (e.g., Cleeremans & Jimenez, 1998; Curran & Keele, 1993).

The third type is control of complex system on computer. Subjects were asked to control an output variable (e.g., production of a simulated factory) by operating input variables (e.g., amount of raw material). Again, they could do this successfully without conscious knowledge of the formula used to relate input variables to output (e.g., Berry & Broadbent, 1984; Dienes & Fahey, 1995).

In short, according to Reber (1993), Winter and Reber (1997), in these types of experiments, complex knowledge is acquired mostly without conscious operations and without explicit knowledge of both the process of acquisition and the knowledge that is acquired, and this process is labeled as implicit learning.

There are two issues about implicit learning that have been widely discussed:

The first issue is the process. In implicit learning, the structural nature of the input is mastered naturally, simply and without conscious operation (N. Ellis, 1994a). This process contrasts with explicit learning, in which the individual pays attention to particular aspects of the stimulus, consciously forms and tests hypotheses in order to search for certain structures (N. Ellis, 1994a). Some researchers (e.g., R. Ellis, 1994a, p. 390; McLaughlin, Rossman, & McLeod, 1983, p. 142) suggested that the distinction between implicit learning and explicit learning is that of peripheral and focal attention. That is, the former involves mere exposure to the rule-governed input with no focused attention to the rules per se; whereas the latter requires focal attention to the regularities underlying the surface stimuli.

The second issue about implicit learning is the nature of the knowledge acquired in this way. Reber (1989) concluded that what is acquired in implicit learning is abstract, rule-based knowledge, on the grounds that the acquired information exceeds what can be verbally expressed and can be applied to stimuli that are not presented during the treatment stage. However, some researchers suggested that the results of implicit learning are knowledge based on memory for fragmentary instances, or a combination of both memory-based and rule-based knowledge (e.g., Dulany, Carlson, & Dewey, 1984; Vokey & Brooks, 1992). Dulany et al. (1984) quoted the artificial grammar learning experiment by Reber and Allen (1978) and showed that during the retrospection phase some subjects mentioned that "first and last letters, bigrams, the occasional trigram, and recursions" (p202) were important in their grammaticality judgment. Dulany et al. further argued that subjects had explicitly remembered fragments of strings and their judgment was based on similarity of instances rather than unconscious representations of a formal grammar. Vokey and Brooks (1992) reported that resemblance between the instances used in training and those in transfer test affected test judgment more than rule conformity. They suggested that dual knowledge and rule and instance models of representation (Knowlton & Squire, 1996; Logan, 1988) could explain this phenomenon. In other words, the effects of implicit learning are attributable to a synergy of both abstract rule-based knowledge and concrete instance-based knowledge. This view was adopted by several other researchers (e.g., Mathews, Buss, Stanley, Blanchard-Fields, Cho, & Druhan, 1989, Shanks & St. John, 1994). Moreover, it was argued that processing demands of tasks can predispose learners to rely more heavily on one type of knowledge than on the other. When subjects had seen few example strings, they tended to memorise them and use them as the standard against which to make judgments about the grammaticality of new strings; but when they had seen many exemplars, subjects would induce more abstract representation (McAndrews & Moscovitch, 1985; Meulemans & Van der Linden, 1997).

To sum up, experiments in cognitive psychology showed that people can acquire the underlying rule of complex stimulus without paying focused attention to the rule per se at the point of learning. The product of this implicit learning process is still a controversial issue, but many researchers maintained that it is a blend of rule-based and instance-based knowledge.

2.3.2. Implicit learning of L1 collocations

As previously mentioned, N. Ellis (1997) viewed acquisition of collocations as predominantly an implicit process, that is, we develop collocational competence through meaning-focused receptive and productive language use rather than overtly exploring any underlying collocational patterns. According to N. Ellis, as long as individuals are exposed to and also attend a sufficient amount of speech stream, analysis of the frequency and sequence information will take place automatically. In this part, I will review some of the research related to the details in this implicit learning process.

2.3.2.1. Process of chunking

There is one mechanism claimed to play a central role in acquisition of collocations, that is, *chunking* (N. Ellis, 1996, 1997). The term *chunking* was coined by George Miller in his review of STM (Miller, 1956). Miller distinguished "bits" of information from "chunks" of information. Bits of information can be weld together and formed into a chunk, which itself becomes a unit of memory organization. Chunks that have already been formed in memory can be further brought together and develop into a larger chunk. Chunking implies the ability to build up such structures recursively and develop permanent sets of associative connections in LTM (N. Ellis, 1996; Newell, 1990, p. 7).

Chunking is a pervasive feature of human memory and people chunk at a constant rate (Newell, 1990, p. 7), especially when the stimuli elements are frequently observed occurring together (Nation, 2001, p. 320). In the language we hear or read, there are many recurring phrases or clauses. On the one hand, the more certain units are repeated in STM, the greater the LTM for these items (see Melton, 1963). On the other hand, our phonological LTM is automatically tuned to the regular sequence, which allows these recurring patterns to be more readily perceived from the input. As N. Ellis (1997) put it, "...our phonological memory systems automatically, and often unconsciously, abstract regularities or patterned "chunks" from the collective evidence of the stream of speech to which we are exposed" (p. 124).

Many empirical studies of language acquisition (e.g., Clark, 1974; Nattinger & DeCarrico, 1992; Nelson, 1973; Peters, 1983) have shown that attended speech is chunked automatically by L1 learners. Children use a large number of unanalyzed or partly analyzed chunks of language as if they form a single unsegmented unit before they learn the meanings of the individual words (e.g., "How are you", "Give me", "go on"). This special sub-group of collocations has been named as *lexical phrases* (Nattinger & DeCarrico, 1992), *holophrases* (Corder, 1973), *formulaic speech* (Wong-Fillmore, 1976), and *lexical chunks* (Lewis, 1993). Hakuta (1976) and Krashen and Scarcella (1978)

further divided these chunks into *routines* and *patterns*. *Routines* are utterances learned as memorized and unanalysed chunks, such as *at any rate*, *by and large*, and *as it were*. *Patterns* are utterances that have been partially analyzed and possess one or more open slots, such as __ *sorry to* ___, and ___*ago.*

In a study of 18 children producing their first fifty words, Nelson (1973) found a sharp contrast between the so-called referential and expressive children. The expressive group produced 6 to 18 phrases during the research period, while the referential group produced only 0 to 5 phrases. These speech units include "expressions useful for dealing with people" (e.g., *go away, stop it, do it, I want it*) and "may be considered as preformed or stereotyped units... which can be combined into larger units but are not themselves analyzable. Thus, they are equivalent to words in their linguistic function"(p.25). Clark (1974) found that her son Adam, at age 2;9 to 3;0, often incorporated a part of a preceding adult utterance into his own utterance. For example,

Mother: That's upside down.

Child: No, I want to upside down.

Bolinger (1976) claimed that "learning goes on constantly - but especially with young children - in segments of collocation size as much as it does in segments of word size..." (p.8). Pawley and Syder (1983) proposed that most words are stored for multiple times, once as an individual word and numerous times as a part of a larger stored chunk, for example, a phrase, a clause or even a unit of longer length.

Studies of word association (asking individuals to say what is the first word that comes to their mind when they hear a stimulus word) also indicate that in L1 acquisition there is a period when a word's collocation is most prominently represented in a person's mind. One of the most extensive studies of L1 learners' word association is that of Entwisle (1966). The study found that (1) *clang associates* (i.e., giving responses that are phonologically similar to the stimulus words, e.g., bitter → litter, present → pleasant) were rare and most frequently found among first-grade children; (2) the major difference between younger and older children lay in the shift from syntagmatic response (e.g., bitter → taste, on → top) to paradigmatic responses (e.g., bitter → sweet, on → off). It is generally assumed that salient representations of lexical items (phonology, semantics, syntax, etc.) tend to drive word association responses (N. Ellis, 1996), so Entwisle's study indicates that in early stage of L1 acquisition, the phonological features of lexical items are most strongly represented in one's mind, then there is a focus on a word's collocations (most probably as a result of chunking at the level of phrases), and finally syntactic and semantic classifications begin to emerge.

2.3.2.2. Results of chunking

The language input that is implicitly chunked by individuals can develop in three directions, as identified in previous literature:

First, it might remain to be "unanalyzed wholes" and function as integrated wholes. During online processing, these chunks can be accessed quickly and contribute to the development of fluency, because they do not require a lot of internal computation.

Second, memorized smaller unanalyzed chunks might be combined with other chunks to form into larger chunks (Nation, 2001, pp. 319-320), which can also be mobilized in a particular communicative context and enable fluency to be achieved.

Third, acquired chunks may be analyzed later. As N. Ellis (1996, 1997) argued, the analysis may lead to knowledge of the statistical frequencies and sequential probabilities of the words. This process and the resultant knowledge is implicit in the sense that the learner does not consciously analyze the sequence information and he/she knows which word goes with which "by feel" rather than any explicit rule.

Moreover, some researchers suggested that the analysis of chunks may also lead to the creation of novel constructions and acquisition of syntactic features or rules. In a study of the development of inflection in the Harvard children, Cazden (1968) wrote that "the child begins to operate with stored fragments of speech he has heard... which are somehow tagged liberally for semantic information on the verbal and nonverbal context and only later are gradually subjected to analysis for the acquisition of productive rules"(p.437). N. Ellis (1997) argued that through automatic implicit analysis of a word's sequential position relative to other words in the phrases that have already been stored, children can learn the grammatical word class of a word and grammatical structures. Skehan (1998, p. 56) suggested that chunk analysis may generate rules and the rules can be further used to create other exemplars, which are then available for access as integral wholes. Peters (1983) provided a detailed description of how unanalyzed chunks can eventually become analysed into formulaic frames with slots and then into the syntactic patterns of the language. For instance, a child is able to accumulate a number of phrases that begin with the same unit *all*: *all clean, all done, all dry, all gone, all through, all wet.* Then he/she might make an abstraction from "unit+unit" to "unit+list" (i.e., *all* + *clean, done, dry, gone, through, wet*). The next move is the generalization from "unit+ closed list" to "unit +open class" by detecting the common feature of the words in the closed list (p.45). Once this productive pattern is achieved, the child is able to create novel combinations. Peters regarded this step as the most crucial abstraction in the early acquisition of syntax. Similarly, Nattinger and DeCarrico (1992, p.12) suggested that initially a child may frequently use a phrase like *I-want-to-go* as if it were a single unit.

Gradually, when he/she encounters other chunks with similar patterns (e.g., *I-want-to-get-up, I -want-my-ball*), he/she may detach the pattern from the chunks and acquire regular syntactic rules.

2.3.2.3. Summary

On the basis of previous research, we may conclude that acquisition of L1 collocations is an implicit process. People acquire a word's collocational features through mere exposure to numerous instances, without consciously searching for or paying focal attention to the formal collocational regularities. In this process, attended speech is automatically chunked by L1 learners. The chunked units and long-term knowledge base of word sequence can serve as memorized formulas that can be retrieved fast in language use and also be used as raw material for later analysis that leads to very abstract knowledge in frequencies and sequential probabilities of the words. Moreover, as argued by some researchers, syntactic patterns can emerge from the chunk analysis. This account of collocation acquisition corresponds to the view that knowledge acquired through implicit learning is both exemplar-based and rule-based (see the discussion in 2.3.1).

2.4. Acquisition of L2 collocations

Although acquisition of L1 collocations seems to be quite "effortless", acquisition of L2 collocations appears to be a much more difficult process. It is by no means easy for a non-native speaker (NNS) to distinguish which of the grammatically well-formed L2 sentences are nativelike, normal or unmarked and which are unnatural or highly marked. As noted by Gass and Selinker (2001), "The problem for the learner is to learn how not to be innovative and stick to the standard combinations" (p392). This section is going to review previous research on acquisition of L2 collocations, which is concerned with (1) the problems in the collocations produced by L2 learners; (2) the process of learning L2 collocations, especially the role of attention in it.

2.4.1. Problems in production

A major theme of the research on L2 collocations was to identify the problems in learners' production and classify their causes. The data often came from corpora of learners' argumentative or narrative writing (e.g, Chi, Wong & Wong, 1994; Granger, 1998; Lennon, 1996; Lorenz, 1999; Nesselhauf, 2003) or was elicited from experimental tasks like L1-L2 translations (e.g., Bahns & Eldaw, 1993; Farghal & Obiedat, 1995; Gabrys-Biskup, 1992) and cloze tests (e.g., Bahns & Eldaw, 1993; Farghal & Obiedat, 1995). There are three important findings in these studies:

First, many problems in L2 collocation production originate from L1 influence. When learners learn a word for a concept, they often assume that they can extend the use of that word to the same contexts as its corresponding item in L1 and this literal translation process may cause errors when L1 and L2 do not match (Bahns, 1993; Chi, Wong & Wong, 1994; Farghal & Obiedat, 1995; Gabrys-Biskup, 1992). For example, **drive a bookshop* (transfer from Polish *kierowac sklepem*) (Gabrys-Biskup, 1992); **do exchange* (transfer from Chinese *zuo jiaoyi*) (Chi, Wong & Wong, 1994). In addition to literal translation, Gabrys-Biskup (1992) found that assumed formal similarity between L1 and L2 could account for some of the errors made by German learners of English. For instance, *crack nuts* was rendered as *crunch nuts* or *crunk nuts*, an attempt at anglifying the German lexeme *knacken.*

L1 influence is also reflected in the overuse and underuse of certain items. Granger (1998) reported on a study of a subcorpus of the ICLE (International Corpus of Learner English) database and a NS corpus of English. The comparison of the two corpora showed that L2 collocations with a direct translation equivalent in L1 were regarded as safe bets and overused by learners, but those without a direct L1 translation equivalent were underused. For instance, phrases with amplifiers like *completely* and *totally* were overused by French-speaking learners of English, but *highly* was underused.

What is interesting is that learners seem to transfer an L1 collocation to L2 in a systematic way. Kellerman and Jordens (1977) suggested that psychologically marked features tend to be perceptually more complex and are thus less likely to be transferred than unmarked features. So when L1 and L2 are perceived as distant by learners, only core meanings (i.e., most frequently used, literal, and concrete meanings, psychologically unmarked features) will be transferred. As to the peripheral meanings (i.e., more abstract meanings, psychologically marked features), they might be rendered by means of synonyms or paraphrases. This tendency was demonstrated in an experiment reported in Kellerman (1979). Kellerman gave Dutch learners of English a list of Dutch sentences with various meanings of the word *breken* (*break*) (e.g., *hij brak zijn word (He broke his word), hij brak zijn been (He broke his leg)*) and asked them which of the translation equivalents could be used in English. He found that when *breken* was used in a sense closest to the core (e.g., *hij brak zijn been (He broke his leg)*), learners tended to accept its English direct translation equivalent, but when *breken* was used in a more peripheral sense (e.g., *hij brak zijn word (He broke his word)*), they were less likely to accept the equivalent. Similarly, Gabrys-Biskup (1992) reported cases in which the learners were reluctant to transfer the metaphorical use of an L1 (Polish) word to L2 (English), although sometimes the target L2 collocation was exactly a word-for-word equivalent of the L1 one. For instance, *czysty przypadek* can be literally translated as *a pure coincidence*; however, Polish students still preferred to translate it as *a plain/ total/ straightforward coincidence* rather than *a pure coincidence.*

Second, problems in L2 collocation production are also associated with intralingual factors. One factor is the frequency of collocations. Hussein (1990) found that in a cloze test which asked learners to complete a sentence with one of the four provided words, students majoring in English at a university in Jordan did quite well with collocations commonly used in everyday life, e.g., *have a seat, fine arts, missing link, second thought, spare parts*. This result is not surprising, because as discussed in 2.3.2.1, the chances of retaining certain items in LTM increase with their frequency in input. The other intralingual factor that influences collocation production is the type of collocations (free collocations, restricted collocations, idioms). This issue will be the focus of the following discussion.

Free collocations seem to be the easiest to acquire. Putting aside syntactic well-formedness, we may say that the only co-occurrence constraint for this category is a matter of semantic compatibility (see the discussion in 2.1.2). Allerton (1984) claimed that "... this level of word cooccurrence restriction is not something the speaker has to learn about. Once the meanings of the words are known, the limitation follows automatically"(p. 21). For example, learners will not produce odd combinations like **pacify the house*, **tall information* if they know the meanings of the individual words.

Idioms are more difficult for learners both in comprehension and in production.

Because the meaning of an idiom is non-transparent, learners might not be able to recognize immediately its intended meaning (Cooper, 1999; Hatch & Brown, 1995; Laufer, 1997). Moreover, the fixed nature of an idiom can be a problem for learners; even misuse of a small particle (e.g., article) can make a speaker sound ridiculous (e.g., **She let a cat out of a bag*) (O'Dell, 1997). Overall, idioms present a special learning problem and NNSs use much fewer idioms than NSs (Howarth, 1998).

Restricted collocations, in which the word selection does not solely depend on syntactic principles and semantic compatibility, also pose great challenges for learners. In a study of a corpus comprising of English assignments written by university students in Hong Kong, Chi, Wong and Wong (1994) found that learners had difficulty in using delexical verbs (*have, make, take, do, get*). There were confusions of these verbs with each other (e.g., **do effort (make)*, **make discussions (have)*) and also confusion of these verbs with other types of verbs (e.g., **make solution (find)*, * *get goal (reach)*). Howarth (1998) made a comparison between NS corpus of written British English and NNS data drawn from a set of 10 essays written by 10 non-native postgraduate students as assignments. It was concluded that NNSs of English, whatever their L1 is, used about 50% less restricted verb-noun collocations (and idioms) than NSs did, and the delexical and figurative use of a verb were the most difficult for learners. Moreover, Howarth identified two possible sources for learner errors: 1) blending two collocations that had a semantic similarity in their noun element (e.g., *pay attention, make an effort* → **pay effort*); 2) filling in a collocational gap within a partially overlapping cluster (e.g., *assign a role to, assign a value to, attach a value to* → **attach a role to*). In a study of the data from the German subcorpus of ICLE, Nesselhauf (2003) differentiated two types of restricted collocations: combinations where the verb (in the given sense) can only take a limited number of nouns (e.g, *run a risk*), and combinations where the verb (in the given sense) can take a wider range of nouns (e.g. *exert* + *control, pressure, influence, authority, power*). It turned out that learners were mostly aware of the restriction in combinations of the former type, but tended to be too creative with combinations of the latter type.

Third, in addition to L1 and L2 factors, production of L2 collocations is also found to be influenced by proficiency levels. In Kellerman's (1979) study of the phrases of *breken*, which was referred to earlier, a U-shaped learning curve was discovered, where beginners and advanced learners were most willing to transfer the use of *breken* in instances further from the core meaning. It was suggested that perhaps beginners were more daring and more willing to try something uncertain, advanced learners might have learnt various senses of *breken*, while intermediate learners were more cautious.

In short, previous empirical research on L2 collocations has been trying to find out what forms are misused, overused or avoided and why. These findings can provide us with some insights into the learning process, but only indirectly. According to Gass (1988a), there are five stages involved in the conversion from the input to the output: (1) apperceived input (the bit of the language that a learner is exposed to and also notices), (2) comprehended input (the part of the input that a learners understands), (3) intake (the part of the linguistic material that is internalized or assimilated by the learner), (4) integration (the development of L2 grammar or storage of the information contained in the input), and (5) output (learner's production of that language). Under this model of SLA, we may reinterpret the production data from the perspective of learning process. For example, the learner errors in L2 collocations, as identified above, tell us that during the intake stage learners' hypothesis formation about a word's collocational behavior is influenced by their L1 (e.g., accepting a word-by-word L2 translation of an L1 collocation), by features in L2 (e.g., making overgeneralization errors with a word used in its restricted sense) and also by proficiency level (e.g., making more conservative hypothesis about a word's possible collocates because of the past experience with the language). Moreover, according to Gass, among the factors that may determine what output will take place are (1) confidence in one's ability to produce correct target language, (2) degrees of strength of knowledge representation (perhaps related to the automaticity of language processing).

Learners' underuse and overuse patterns, as summarized above, indicate that factors like the congruence between L1 and L2 (whether the word-by-word translation of a L1 collocation is acceptable in L2), types of the L2 collocations (free vs. restricted collocations) and frequency of L2 collocations can influence how fast certain items can be accessed and how confident one is in using these items. To sum up, analysis of the problems in learner production can reflect certain aspects of the later stages in the learning process. In the next part, I will review the discussions and empirical studies that concern the initial stages in learning L2 collocations, more specifically, how different levels and types of attention (peripheral vs. focal attention) influence the learning of L2 collocations.

2.4.2. Attention in learning L2 collocations

In previous literature, there have been some discussions about the best way to learn or teach collocations, which are related to the issue of attention. One recurrent view is that learning L2 collocations is predominantly a byproduct of natural exposure to L2. That is, by repeatedly coming across the same words occurring together in the same order, individuals can store implicitly learned collocational patterns. And there is no need to pay focal attention to a word's collocational features per se by making and testing conscious hypothesis or other means. Under this view, acquisition of L1 collocations and L2 collocations are basically the same. According to Mackin (1978), learners cannot hope to learn all the collocations they should know in any systematic way and the only way to acquire some degree of collocational competence is years of reading, observation and learning of the language. Similarly, Gabrys- Biskup (1992) suggested that "probably the best and easiest way for students to acquire the collocational system of a foreign language is to be extensively exposed to a live language spoken and used by native speakers at a certain period of time" (p.40). Kennedy (2003) expressed the same view, but from a teacher's perspective. According to him, the frequency with which individuals experience words and groups of words significantly influences the extent to which these linguistic items are associated, stored and retrievable from memory; therefore the most important task in teaching collocations is to maximize opportunities for learners to acquire them through "autonomous implicit learning activities such as reading". The arguments by Schmidt (1995) and N. Ellis (1997) more explicitly addressed the issue of attention. Schmidt (1995) claimed that although the abstraction of more complex rules requires undivided attention, simple item learning or the learning of very simple patterns (e.g., vocabulary words plus their collocation) seems to be possible when attention is divided. This comment implies that acquisition of L2 collocations does not require focal attention to the relevant items. According to N. Ellis (1997), collocation acquisition (both L1 and

L2) is mainly an automatic and implicit process that takes place as learners' vocabulary extends and as they practise hearing and producing the words. As he put it, "... general learning mechanisms of chunking and sequence analysis, operating in the particular domain of phonological memory" allow the acquisition of formulas, phrases, idioms, and word collocation information (p.133).

There have also been researchers who emphasized or admitted the value of pedagogical attempt that aims to induce focal attention to collocations per se (e.g., Bahns, 1993; Lewis, 2000; Moon, 1997; Nesselhauf, 2003). Lewis (2000) pointed out that too often students and teachers look for and record only individual new words in texts and this way of learning is to misidentify the constituent chunks. According to him, it is pedagogically helpful to (1) ensure that students are aware of word partnerships (e.g., by having them keep a record of what words are in the company of a word); (2) raise students' consciousness awareness of the lexical nature of language and the importance of collocational knowledge. Some researchers suggested that it is beneficial to focus on the following types of collocations: (1) collocations frequent in a neutral register and any special register that is of use to the learner (Moon, 1997; Nesselhauf, 2003); (2) collocations which do not have a direct equivalent in L1 (Bahns, 1993; Nesselhauf, 2003).

Even among the researchers who think that collocational learning is essentially an implicit process, there are some who acknowledged the potential value of focal attention to this language area. N. Ellis (1997) noted that acquisition could be speeded up by making the underlying collocational patterns more salient through explicit instruction or consciousness-raising. Kennedy (2003) stated that although teaching explicitly the complex system of collocations is not easy, some explicit instruction in frequently occurring collocations is almost certainly worthwhile.

In spite of these discussions, to my knowledge, there have been very few empirical studies that examined the role of attention in learning L2 collocations. There is one study relevant to this issue. Boers (2000) conducted three experiments with intermediate learners of English in Belgium and found that classroom activities aimed at enhancing language learners' metaphor awareness could facilitate retention of unfamiliar figurative expressions. In the first experiment, two parallel groups of pupils were asked to read a text, which included many expressions to describe anger: *cry it out, bottle up the emotions, ventilate one's emotions, blow off steam...* After reading the text, the experimental group received vocabulary notes organized along various metaphoric themes, for instance,

Anger as a hot fluid in a container: *anger welled up inside me, she erupted...*

Anger as fire: *an inflammatory remark, she exploded...*

...

The control group received the same vocabulary input, but the vocabulary notes were organized along pragmatic or functional lines, for instance,

To describe acute and sudden anger: *she exploded, she erupted...*

To describe anger as a process: *anger welled up inside me, an inflammatory remark...*

...

After reading the notes, both groups could ask for further clarification and participated in a guided class discussion about anger and conflicts. Finally the participants were given a cloze test with ten items meant to elicit the lexis studied and they were encouraged to list several answers per gap if they could. The results of the test showed that the experimental group was significantly more likely to reproduce the lexis studied than the control group. The advantage of the experimental group was also found in the other two experiments, which concerned other types of figurative expressions (Experiment 2: items that describe downward and upward trends such as *creep up, go downhill, skyrocket, crash*; Experiment 3: phrases using orientational metaphors, such as *cheer up, feel down* (GOOD IS UP, BAD IS DOWN). However, Experiment 3 also found that the experimental group was not any significantly better than the control group in filling the gaps meant to elicit the expressions that had not been included in the treatment. Boer made two major points about these results: (1) identifying source domains of the metaphoric use of a word provides a framework for lexical organization and encourages deep-level cognitive processing, which in turn promotes memory storage; (2) there is "no successful transfer of the cognitive semantic approach" when learners try to tackle new phrases, as indicated by the results of the novel items in Experiment 3.

In Boer's experiments, both the experimental and control groups paid some focal attention to the target collocations, because the target was presented separately and as a unit for them and there were special learning activities focusing on these phrases. However, the two groups paid focal attention to the targets on different levels. For the experimental group, the metaphoric relations underlying the phrases were explicitly revealed and explained to the learners. For the control group, learners focused on mapping the word sequence with a particular meaning. The fact that the experimental group excelled seemed to indicate that focal attention at the level of knowing the underlying structure and organization is more effective for collocation learning than attention at the level of meaning comprehension.

To sum up, there have been very few studies on the role of attention in L2 collocation learning. Most of them are discussions about the best way to learn or teach collocations. One dominant view is that learning collocations mainly results from natural exposure to the language. However, some researchers suggested that pedagogical intervention is beneficial (e.g., encouraging learners to chunk phrases and learn them as a whole, enhancing learners' awareness of word partnerships). In other words, focal attention in this area can be facilitative. There has been a lack of empirical research that directly tests these assumptions and explores the exact role of attention in learning L2 collocations. The current study aims to deal with this issue that hasn't received satisfactory treatment yet. In the next section, I will give an overview of the abundant research on attention in learning other language areas, which essentially shapes the questions of my study.

2.5. More issues about attention

2.5.1 Attention in learning L2 syntax and morphology

2.5.1.1. Attention at the level of noticing-- the Noticing Hypothesis

Most of the research that explicitly addressed the issue of attention in SLA was based on syntax and morphology learning and they were frequently centered on the Noticing Hypothesis (Schmidt 1990, 1994, 1995; Schmidt & Frota, 1986). According to the strong version of the hypothesis, although learning without intention or explicit metalinguistic knowledge of what has been learned is possible, learning without awareness at the level of *noticing*, which is essentially isomorphic with focal attention, is impossible. Here "noticing" is used as a technical term equivalent to "apperception" (Gass, 1988a), to "detection within selective attention" (Tomlin and Villa, 1994) and to "detection plus rehearsal in short term memory" (Robinson, 1995b). As to the content of noticing, Schmidt argued that it must be whatever evidence is relevant for a particular learning domain rather than the input in a global sense. For instance, to acquire syntax one must pay attention to word order and meaning. The weak version of the Noticing Hypothesis claims that even if noticing is not necessary, it is certainly helpful and contributes to learning and retention. As stated by Schmidt (2001), "... since many features of L2 are likely to be infrequent, non-salient, and communicatively redundant, intentionally focused attention may be a practical (though not theoretical) necessity for successful language learning" (p. 23).

Many other researchers have put forth arguments for the importance of focused attention or attempts to induce focal attention. According to Long (1991), *focus on form*, that is, paying focal attention to certain linguistic features in the context of using the language meaningfully, may be required for learning; otherwise, certain items in the input may go unnoticed, unprocessed and thus not learned (e.g., the grammatical tense verb morphemes that tend to be ignored by learners, probably because of the high salience of temporal adverbs). Terrell (1991) suggested that explicit grammar instruction, defined as "the use of instructional strategies to draw the students' attention to, or focus on, form and/or structure" (p. 53), can function as (1) an advanced organizer, which provides learners with comprehension strategies that highlight crucial grammatical elements; (2) a meaning-form focuser that highlights non-salient and communicatively redundant relations. MacWhinney (1997) pointed out that explicit instruction can help students narrow down certain hypotheses and consolidate the memory trace of particular items. "Students who receive explicit instruction, as well as implicit exposure to forms, would seem to have the best of both worlds" (p.278). According to Peters (1998), in every aspect of language learning (grammar, phonology, semantics, pragmatics, vocabulary, discourse), learners must attend to and notice any crucial source of variation. Peters gave the following example: In English, both *I turned the covers down* and *I turned down the covers* are acceptable, and there is no difference in meaning that is determined by the position of the direct object; however, learners must also notice that *I turned it down* is possible, but *I turned down it* is possible only in the sense of *I turned down the road.* Williams (1999) claimed that learners do not simply absorb input and abstract the underlying regularities. "Even rules that might be thought of as simple and transparent

(e.g., plural marking of nouns) might fail to be induced if the relevant forms and meanings are not segmented out of the input stream and intentionally associated together in an instance" (pp. 40-41).

However, not all researchers agree that noticing is the attentional level required for learning L2 syntax. Some claimed that adults can best learn L2 syntax by attending to meaning alone and grammatical patterns will be abstracted from the input incidentally and subconsciously (e.g., Krashen, 1992, 1994; Schwartz, 1993; Schwartz & Gubala-Ryzak, 1992; Zobl, 1995). In other words, it is not necessary to pay focal attention to word order, to search for or learn syntactic rules. Tomlin and Villa (1994) argued that there is a lot of evidence showing that information can be cognitively detected even though the individual is not aware of its occurrence. For example, subliminally presented words may activate their meanings without the subject being aware of them (Marcel, 1983). Moreover, according to Tomlin and Villa, detected information can be further used for processing, hypothesis formation and testing. That is, conscious registration is not the minimally necessary level; instead, detection with peripheral attention is the level by which SLA must operate.

It has to be noted that the usefulness of unconscious detection for learning is controversial. According to Holender (1986) and Shanks and St. John (1994), subliminal exposure effects are not likely to last for more than a few hundred milliseconds and they are rapidly lost from memory. Kellogg & Dare (1989) pointed out that "the degree of elaboration resulting from unattended encoding appears to be too limited to have any substantive influence on human cognition or behavior "(p. 412). Robinson (2003) made a similar point by saying that cases of unconscious detection are evidence of automatic, unaware activation of LTM representation, not of learning.

2.5.1.2. Empirical evidence for the Noticing Hypothesis

In the field of empirical research, there has been a large number of findings that lend support to the Noticing Hypothesis.

First, studies of learners' introspective or retrospective data (e.g., the data from diary, think-aloud activity, interview, questionnaire) indicated that noticing is crucial for L2 development. Schmidt's diaries of learning Brazilian Portuguese showed that the forms appearing in his interactions with NSs were closely connected with his recorded noticing in the diary (Schmidt & Frota, 1986). Cases of incorrect use could also be attributed to wrong analysis of what he heard. Alanen (1992) asked English-speaking participants to learn locative suffixes and a phonological phenomenon of Finnish under one of four conditions: (1) input enhancement, in which the relevant features were highlighted by italicization, (2) rule provision, (3) rule provision and enhancement, (4) control (mere exposure with no rule or enhancement). All participants described their thoughts as they went along. Subsequent unexpected tests showed that, generally speaking, learners who reported that they paid attention to the target forms had acquired them, whatever the treatment, and there were no learners who acquired the targets without having noticed them. In a study of learning Spanish stem-changing verb form, Leow (1997) asked learners to think aloud while completing an L2 crossword puzzle. He found that learners who stated some types of rule about the stem change performed more accurately on subsequent tasks than those who mentioned the forms but did not state any rule. And the latter group did better than those who did not mention the forms.

Second, many experimental or quasi-experimental classroom studies have been conducted, comparing learners who focused on meaning alone with learners for whom certain strategies were used to induce noticing, for example, input enhancement (i.e, highlighting the target features by color-coding, italicization, underlining, etc.), input flooding (i.e., artificially increasing the number of target forms in the input), instruction to search for certain rules, provision of pedagogical rules (e.g., Alanen, 1995; Day & Shapson, 1991; DeKeyser, 1995; Doughty, 1991; Jourdenais, Ota, Stauffer, Boyson & Doughty, 1995; Leeman, Arteagoitia, Fridman, & Doughty, 1995; Lightbown, 1991; Lightbown & Spada, 1990; Master, 1994; Robinson & Ha, 1993; Shook, 1994; Spada,

1987; Spada & Lightbown, 1993; White, 1991; White, Spada, Lightbown, & Ranta, 1991; also see Long, 1996, Norris & Ortega, 2000, for a review). The latter group generally performed better and the advantages seemed to be durable. The following are three examples:

Doughty (1991) compared three conditions of learning object-of-preposition-type relative clauses: an exposure only group, a meaning-oriented group with enhancement, and a rule-oriented group which was informed of the rule. For 10 days, all participants read sentences containing the targets. The post-tests showed that both the meaning-oriented group with enhancement and rule-oriented group were superior to the control group in their ability to relativize.

White (1991) compared the performance of three uninstructed classes with two classes who received two weeks' formal instruction in question formation (a week of explicit rules followed by corrective feedback on learner errors). The immediate posttest (sentence correction activity) indicated that instructed learners were significantly more accurate. In the second phase of the study, which included more testing activities (written and oral communication tasks) and a delayed test 5 weeks after the instructions, instructed learners still outperformed the uninstructed ones.

Jourdenais et al. (1995) investigated how English learners learned Spanish preterit and imperfect verbs under one of two conditions: with highlighted input and with no typographical modification. The enhanced group produced more target items in subsequent writing task than the group without enhancement.

2.5.1.3. Attention at the level of rule understanding

In the preceding discussion, I mentioned various types of techniques that aim to induce noticing or focal attentive processing of certain forms. These techniques display different degrees of explicitness, which might lead to variegated levels of focal attention. Following DeKeyser (1995), treatment can be considered as explicit if a pedagogical rule is given or learners are asked to search for certain metalinguistic generalization on their own. Techniques like input flood and input enhancement are relatively implicit, because they only make forms more salient with no explicit instruction about how to process the input (Doughty & Williams, 1998). An issue that is frequently discussed in the literature is: Do more explicit techniques lead to better results? Or, more specifically, does explicit rule formulation in the student leads to higher levels of achievement?

According to Schmidt (2001), "...the objects of attention and noticing are elements of the surface structure of utterances in the input -- instances of language, rather than any abstract rules or principles of which such instances may be exemplars" (p. 5). He further claimed that rule understanding, is not necessary for learning, but can be facilitative. The first part of the claim does not seem to be controversial. There is a lot of evidence showing that conscious rules are not required for L2 learning. For example, in the study by Green and Hecht (1992), German ESL learners could correct many errors, although they could not articulate the rules or gave incorrect rules. However, the second part of Schmidt's claim, which concerns the facilitative role of rule understanding, is a much more debated issue.

On the one hand, a significant body of research showed that rule-based condition is beneficial: it helps learners bring order to the input and also enables them to generalize the knowledge to novel instances. Hulstijn and Hulstijn (1984) found that learners with explicit knowledge of two Dutch word order rules had significantly higher performance scores than learners who were unable to verbalize the rules, although the latter performed at better-than-chance levels on one of the target structures. In the classroom studies by Scott (1989), an explicit group was provided with French rules about relative pronouns and subjunctive and an implicit group read texts flooded with the target items. On written posttests, the explicit group showed a significant advantage. Dekeyser (1995) focused on the learning of categorical and prototypical rules in an artificial language under one of two learning conditions: (1) explicit-deductive learning (rule teaching followed by thousands of illustrative picture and sentence combinations); (2) implicit-inductive (mere

exposure to thousands of picture and sentence combinations). As far as acquisition of categorical rules is concerned, the two learning groups performed at similar high levels of accuracy in supplying the morphemes in sentences for previously viewed pictures, but the explicit group was significantly more accurate in producing new sentences describing new pictures. DeKeyser interpreted this result as meaning that implicit learning was more item-dependent and memory-based than explicit learning. (The results about the prototypical rule will be discussed in detail later in 2.5.3.2). De Graff (1997) investigated the learning of simple and complex morphological and syntactic forms of an artificial language in about 150 hours of computer-based treatment. The explicit group was presented with rules and also corrective feedback with grammatical explanation, but the implicit group only rehearsed the sentences that contained the target structures. The explicit group performed better than the implicit group, on all test sessions (immediate and delayed posttests) and also on all task types (grammaticality judgment, cloze test, and correction). Norris and Ortega (2000) summarized the results from the experimental and quasi-experimental studies on the effectiveness of L2 instruction (published between 1980 and 1998) by using meta-analysis (i.e., "findings from all available primary research studies are converted to comparable values by estimating the magnitude of an observed relationship or effect, typically referred to as the effect size" (p.163)). Comparisons of average effect sizes from 49 sample studies indicated that treatment involving an explicit focus on the rule-governed nature of L2 structures (including deductive and inductive approach) is more effective than treatments that do not include such a focus.

However, there is also evidence revealing the limitation of rules. For example, in DeKeyser (1995), the advantage of rule instruction over mere exposure was restricted to categorical rules describing simple patterns. Rule instruction could cause learners to overgeneralize (Alanen, 1995; Robinson, 1996). And rules might be less effective if not combined with exemplars (N. Ellis, 1993). The most serious problem is that knowledge of rules does not necessarily guarantee target-like performance. For example, Seliger (1979) found no relationship between performance on the task and having a conscious rule of the a/an allomorphs of the indefinite article in English. Macrory and Stone (2000) observed students who had 4 to 5 years of instruction of French in a British secondary school. The students were able to verbalize rules about the present perfect tense, but in spontaneous conversation they omitted the auxiliary most of the time, except in formulaic utterances.

Some studies concluded that the most important factor for intake is not the presence of explicit information or directions to search for rules; instead, what plays a major role is structured input activities, which is presented by means of practice and involves learners

in making form-meaning connections. VanPatten and Oikkenon (1996) investigated the acquisition of Spanish preverbal direct-object pronouns in three conditions: (1) explicit rule and structured input, (2) explicit rule only, (3) structured input only. The two groups with structured input outperformed the rule only group in both interpretation and production. This indicated that it was the structured input activities not the rules that were responsible for the benefits. This result was replicated by Farley (2003) and Benati (2003). Sanz and Morgan-Short (2004) examined the acquisition of Spanish word order by four learning groups comprised of [+/- rule explanation] (i.e, whether grammar information is provided) and [+/- explicit feedback] (i.e., whether grammar information accompanies corrective feedback or not]. All groups improved significantly and similarly on interpretation and production tests. The lack of effects for rule explanation and explicit feedback leads the authors to conclude that explicit information may not necessarily enhance L2 development. What is sufficient for acquisition is a feature shared by all treatments, that is, structured input activities in which learners need to make responses by processing the target forms for meaning, for example, tasks requiring learners to identify the correct visual cues for a written or oral sentence or to comprehend written input.

In sum, there are mixed findings about whether explicit rule presentation (i.e., a condition facilitating focal attention at the level of rule understanding) is always superior to the learning conditions that do no overtly involve rules (e.g., mere exposure to numerous instances, memorizing instances, engaging in activities that demand form-meaning connections). One possible reason for the complicated picture is that the effect of attention is mediated by other factors. And this issue will be the focus of 2.5.3 and 2.5.4.

2.5.2. Attention in learning L2 word meaning

Like acquisition of L2 syntax and morphology, acquisition of L2 word meaning also depends on the nature of the attentional activities carried out by the learner. There is one view widely supported by psychologists and SLA researchers: more elaborate processing of a new word (e.g., establishing rich associations between the formal and semantic features of a word, paying close attention to the context in which it is used, describing its semantic relations to other words) leads to higher retention than less elaborate processing (e.g., attending to only one of these dimensions) (see Anderson 1995, ch.6; Baddeley 1997, ch.7; Laufer & Hulstijn, 2001; Skehan, 1998). According to N. Ellis (1997), although the acquisition of a word's form, its Input/Output (I/O) lexical specifications, its grammatical class information and its collocations, all mainly involves implicit process of sequence analysis, the acquisition of a word's semantic and conceptual features and form-meaning mapping result from .explicit learning processes, in which cognitive learning strategies and deep, elaborative processing are very effective (e.g., inferring word meanings from context, semantic or imagery mediation between the L2 word and L1 translation). In other words, in terms of learning L2 word meaning, focal attention that involves more elaborative rehearsal is more effective than attention that involves less or no elaborative rehearsal.

However, what exactly constitutes a level of processing in lexical acquisition? How do we know one type of processing is more elaborate than another? Some SLA researchers have operationalized the general labels of attention and elaboration in concrete constructs. Nation (2001, p. 63) described three crucial processes that enhance the retention of a word: *noticing, retrieval* and *creative (generative) use. Noticing* a word is the first step, which may be induced by various factors: pedagogical intervention, the salience of a word in the textual input, negotiation of meaning in interaction, awareness of the gap between what one needs to produce and what one can, etc. *Retrieval* is to recall a word's meaning after perceiving its form or to access a form in order to express certain meaning. Each retrieval can strengthen the path linking form and meaning and make subsequent access to the word easier. *Creative (generative) use* refers to the cases when old words are met or used in ways that are different from previous encounters, which can also lead to mental elaboration that facilitates learning. According to Nation, *noticing,* *retrieval* and *creative (generative) use* are three steps, with the later steps including the earlier ones. In other words, noticing is a prerequisite for successful retrieval, and retrieval is a prerequisite for successful creative use. Laufer and Hulstijn (2001) added a motivational dimension to the constructs of vocabulary acquisition. Under their proposal, depth of processing is operationalized in three concrete task-specific constructs: *need*, *search*, *evaluation*. *Need* refers to learners' desire to meet task demands, which may be externally imposed or self-imposed. *Search* is the attempt to get the meaning of a new L2 word or find a L2 word for a particular concept, which is equal to *retrieval* in Nation's proposal. *Evaluation* involves comparing a given word with other words, comparing a particular sense of a word with its other senses, or assessing whether a word can be used in a context or not. We might say *evaluation* is similar to Nation's *creative (generative) use*, but it covers a wider range of concepts. Laufer and Hulstijn assumed that when everything else is equal, tasks with a higher involvement load, that is, with more amount of *need*, *search* or *evaluation*, will be more effective for vocabulary retention than those with a lower load.

In empirical research of learning L2 word meaning, a large number of experiments showed that more deliberate and effortful learning conditions lead to more gains than the less effortful ones (e.g., Hulstijn 1992; Hulstijn & Laufer, 2001; Laufer, 2000, 2003;

Newton, 1995; Paribakht & Wesche, 1997; Smith, 2004; Watanabe, 1997). This indicates that more focal attention to a lexical item can strengthen the form-meaning mapping.

Watanabe (1997) investigated two groups of students learning 16 target words by reading texts. For one group, the words were glossed in the margin, either in the common single gloss format or in a multiple-choice format. For the other group, students read the same passages without glosses. Three unexpected vocabulary posttests showed that the former group acquired significantly more new words than the latter. According to Watanabe, under the non-glossing condition, learners might understand the text without needing to know the new words, especially when the contexts are very rich, and this might cause reduced attention to the target words and impede learning. However, under the glossing condition, as suggested by Watanabe, learners tended to see the target word as well as its definition when referring to the gloss and might also return to the word in the text to see whether the provided meaning fit in the context. In other words, margin glossing increases the possibility of noticing, which is a crucial first step in learning.

On the other hand, glossing seems to lose its advantage when compared to conditions that require learners to make more mental efforts to get the meaning of a new word. For example, asking learners to infer meaning of a new word through context was found to be superior to margin glossing in a study by Hulstijn (1992). Students who looked up a new word in an electronic dictionary, which involved searching the right form and determining which sense is appropriate when the word had several senses, performed significantly better than those who were provided with margin gloss, both on immediate and delayed vocabulary retention tests (Laufer, 2000).

Smith (2004) reported on lexical acquisition in a computer-mediated communicative environment. By interacting with one another in a synchronous mode over a local area network, pairs of NNSs of English cooperated with each other to complete jigsaw and decision-making tasks that were embedded with unknown target lexical items. According to the results of immediate and delayed receptive posttests (recognizing a new word) and productive posttests (labeling objects with new words), new words that were negotiated for meaning, that is, those involving *noticing* and *retrieval* (in Nation's term), or *need* and *search* (in Laufer and Hulstijn's term), were retained significantly better than those items that were not negotiated. This finding is consistent with that of Newton (1995), in which, items that were negotiated for meaning through confirmation checks, clarification requests, etc. were better remembered than non-negotiated items, even by learners who were simply observing the negotiation.

Besides meaning negotiation, exercises that attract learners' focal attention to new words and demand the processes of *retrieval* and *generative use (*or *search* and *evaluation)* also prove to enhance learning. Paribakht and Wesche (1997) compared vocabulary learning through reading and through reading coupled with exercises that required the use of new words. Both conditions showed significant gains over three months, but the reading plus exercises group acquired more words and also developed deeper knowledge of the new words. Laufer (2003) reported three experiments that compared the gains from reading and the gains from word-focused tasks. In the reading condition, learners read a text with marginal gloss or read and looked up unknown words in the dictionary. In the word-focused task condition, learners completed given sentences, created novel sentences, or incorporated words in a composition. Laufer found that more words were acquired through tasks than through reading even when a particular new word was noticed and looked up in the dictionary in the reading condition.

In conclusion, to the extent that L2 lexical acquisition is about mapping form to semantic and conceptual representations, there is plenty of empirical evidence showing that vocabulary acquisition is facilitated by deeper level of attention. Here attention is used in the sense of selection and effort (see the discussion in 2.2). After a new word is picked out from the input and noticed, the more efforts made to establish and strengthen form-meaning links (either from form to meaning or from meaning to form), the richer associations made between the word and other old knowledge, the higher are the chances that the new word will be acquired.

2.5.3. Attention and different aspects of language

Recently, researchers begin to be interested in differential effects of attention on different parts of language. VanPatten (1994) suggested that "perhaps different aspects of language are processed and stored differentially" (p. 31). Schmidt (1995) also claimed that "different aspects [of language] may require more or less [attention]" (p.14). While challenging the Noticing Hypothesis in the area of syntax, Truscott (1998) indicated this hypothesis might be applicable to other areas, for example, pragmatic knowledge and lexical learning.

2.5.3.1. Complexity of different language aspects

One feature that is often used to distinguish various aspects of language is the complexity of a particular language phenomenon. Many factors have been proposed as influencing the degree of complexity, all affecting the amount of attention and processing effort expended in learning (e.g., DeKeyser, 1998, 2003; Doughty & Williams, 1998; R. Ellis, 1990; Hulstijn & de Graff, 1994; Krashen, 1982; Williams & Evans, 1998). Although they are mostly motivated by the difference within syntactic or morphological phenomena, some of them can also be applied to characterize the complexity in collocational behavior, which will be discussed in Chapter 3. In the following part, I will provide a brief overview of some of the major factors:

(1) Involvement of permutations, additions and deletions. It has been suggested that the more permutations, additions or deletions are involved, the more complex a structure is. For example, Krashen (1982, pp. 97-98) claimed that wh-question formation, which requires extensive permutations of word order, is formally complex, but the addition of the morpheme for third person agreement is simple.

(2) Salience. Salience of particular aspects of a structure is related to the ease with which structural correlates of rules can be noticed and learned, so in this sense structures involving non-salient elements are more complex and thus more difficult to learn than those involving salient elements. For example, wh-question formation is visually and acoustically more salient in preposition stranding (e.g., Who did John give the book to?) than in preposition pied-piping (e.g., To whom did John give the book?), in terms of frequency of occurrence and positions of the wh- word and preposition. This is claimed to be the reason why the former type of structure is easier to be grasped by L2 learners than the latter type (Bardovi-Harlig, 1987; Robinson, 1996).

(3) Size of context. Forms or structures whose applications depend on larger context are more complex than those whose applications depend on immediate context. For example, the alternation between a/an in English, which is determined by immediate

linguistic context, is simpler than the use of perfect tense, which is not always governed by features of the immediate context (Green & Hecht, 1992).

(4) Reliability. Forms or structures whose use can only be captured by probabilistic rules with several or many exceptions are more complex than those whose use can be explained in terms of categorical rules. For example, the patterns in irregular past tenses of English are probabilistic and a number of phonological or semantic characteristics can only determine the likelihood that a certain morpheme or allomorph will appear (DeKeyser, 1998). So this phenomenon is complex in the sense that it cannot be reduced to an economical rule. Sometimes the use of a form or structure is so complex that it cannot be described with satisfactory rule formulations without extensive yet incomplete lists of exceptions (Doughty & Williams, 1998). One example of this category, as illustrated by Westney (1994), is the verbs that do or do not enter into dative alternation in English.

(5) Semantic complexity. Forms or structures whose use is tied to numerous or abstract semantic categories are more complex than those expressing simple and concrete semantic concepts. For example, Krashen (1982, pp. 97-98) considered the use of plural forms in English as functionally simple, that is, the morpheme denotes a very clear semantic concept. However, the choice between definite and indefinite articles in English

is semantically complex because the underlying rules are related to semantic and discourse concerns that are too numerous for the learner to acquire easily (Doughty & Williams, 1998).

It has to be noted that because many factors can contribute to the degree of complexity, it is not always easy to determine whether a particular language phenomenon is simple or complex. For example, Krashen (1982) viewed the third person -s in English as formally simple because it involves very simple addition, but R. Ellis (1990, p. 173) pointed out that this form might involve a long-distance relationship with the grammatical number of the subject. In other words, the use of this morpheme may be considered as complex in terms of size of context.

Another issue that deserves attention is that complexity might be an individual issue. As noted by DeKeyser (2003), complexity can be described as the ratio of a rule's inherent linguistic complexity to the learner's ability to deal with such a rule. A rule that seems to be moderately difficult to one student may seem easy for another who has more language learning experience.

In sum, numerous factors are conspiring to determine whether a particular aspect of language is complex or not.

2.5.3.2. The interaction between attention and complexity

In this part, I will consider the controversy over the differential effects of attention on different aspects of language. Central to the debate is this question: how does the complexity of language areas influence the effectiveness of explicit learning or instruction (i.e., paying focal attention to certain aspects of language through rule search/test or attempts to induce learners' focal attention to certain aspects of language through input enhancement, rule presentation, etc.)?

Reber (1989, 1993) and Krashen (1982, 1985, 1994) claimed that implicit learning is more effective than explicit learning when the stimuli domain is complex and conscious rule learning will be more effective in JUST those instances in which rules are simple. It was pointed out that complex rules are more likely to be forgotten or imperfectly recalled (Reber, 1993) and they can also result in confusion, which may cause learners to fall back on learning individual exemplar sentences (MacWhinney, 1997).

According to N. Ellis (1996), it is not true that explicit learning or instruction is ineffective for all complex areas. He distinguished two types of complex materials. When the material to be learned is relatively complex but there are only a limited number of variables and the critical features are salient, explicit hypothesis testing is helpful and learners will also be able to transfer the knowledge to novel situations. However, "when the material to be learnt is more randomly structured with a large number of variables and where the important relationships are not obvious, then explicit instructions only interfere and an unselective mode of learning is more effective" (p.114).

The view held by Hulstijn and de Graff (1994) is contrary to that of Reber and Krashen. They hypothesized that the advantage of explicit instruction is greater in the case of complex rules than in the case of simple rules. The rationale behind the hypothesis is: simple formal phenomena may be salient enough to be discovered by L2 learners themselves, even when explicit instruction is not available; but for complex domain, explicit instruction can save learners considerable time in discovering the underlying intricate rules.

However, it should be noted that Hulstijn and de Graff also assumed that "the advantage of explicit instruction is greater when language production can only be based on rule application, than when it can be based not only on rule application but also on the retrieval of individually stored items" (p. 105). Although Hulstijn and de Graff separated the issue of "item vs. rule learning" from the issue of "complexity", we may argue that these two are actually related to each other sometimes, because some complex phenomena are essentially lexical that can be treated as item learning. One example is the English verbs that do or do not enter into dative alternation, which was mentioned earlier.

For this type of material, Hulstijn (1995) recommended lexical learning (i.e., simply memorizing individual instances) rather than rule learning. It appears, then, under the view of Hulstijn and de Graff, the advantage of explicit instruction is generally greater in the case of complex rules than in the case of simple rules, but explicit instruction of complex rules might be less effective than asking learners to store individual instances when the target learning items are essentially lexical.

In short, researchers seem to have different views about the differential effects of attention on complexity. It is very likely that the interaction between attention and complexity is quite intricate. Now we will turn to some empirical studies on this issue, which again present a very complicated picture.

Carroll and Swain (1993) examined the learning of L2 English dative alternations, a very complex phenomenon (see the discussion above), under five conditions. Upon making an error, Group A was provided with explicit metalinguistic information about the rule, Group B was simply told that they were wrong, Group C got recast, Group D was asked if they were sure about their response, and there was also a group who did not get any feedback. Subjects were tested twice on the feedback items plus novel items. It was found that although all types of feedback were better than no treatment, those subjects who received metalinguistic feedback performed better in extending to novel cases than those who got implicit feedback. This means explicit learning can be facilitative when the stimuli domain is very complex, which is contrary to the claims made by Reber and Krashen.

Gass, Svetics and Lemelin (2003) compared the learning of three parts in L2 Italian under two conditions. The three parts are: lexicon (the meaning of five lexical items), syntax (wh- question formation in biclausal sentences) and morphosyntax (order/placement and agreement features of direct and indirect object pronouns). The lexicon is considered as less complex than the syntax and morphosyntax, because the target L2 words have semantic counterparts in L1 and the only difference lies in the phonetic shape of the words. However, to learn syntax and morphosyntax, as pointed out by the authors, learners need to isolate forms and learn the correctness of those forms. The two learning conditions in this experiment are: [-focused attention] (mere exposure, attention directed towards irrelevant parts) and [+focused attention] (rule presentation coupled with examples or instruction to guess word meaning]. Analysis of pretest-to-posttest gains showed that [+focused attention] condition facilitated development in lexicon, syntax and morphology, but its greatest effect size was noted in syntax/morphosyntax (the most complex area) and the least in lexicon (the most simple area). The authors suggested that with the lexicon learners are able to use their own internal mechanisms to generate attention, but for learning very complex and abstract areas, learners cannot solely rely on their own internal devices and explicit instruction may be necessary. This result lends support to the hypothesis by Hulstijn and de Graff and does not support the claims by Reber and Krashen.

Dekeyser (1995) (see previous discussion 2.5.1.3) focused on the learning of two types of rules in an artificial language: (1) categorical rule (the simpler area); (2) prototypical rule in the sense that there was a choice between two possible morphemes and the choice of the allomorph was probabilistic (the more complex area). There were two learning conditions: (1) explicit-deductive learning (rule teaching followed by thousands of illustrative picture and sentence combinations); (2) implicit -inductive (mere exposure to thousands of picture and sentence combinations). This experiment made two major findings. First, as far as acquisition of categorical rules is concerned, the explicit group was significantly more accurate in producing new sentences describing new pictures. Second, as far as acquisition of prototypical rules is concerned, there was no difference between the two conditions in production of sentences describing old and new pictures, although the implicit learners appeared to be more sensitive to the probabilistic nature of those rules. To sum up, explicit instruction is superior to the implicit condition in learning simple rules, but this superiority seems to be leveled in the learning of more complex rules.

Similar results to those of DeKeyser were obtained by Robinson (1996). There were two target rules in Robinson's study: (1) hard rule -- a rule about how to form pseudo clefts of location (e.g., *Where Mary and Johan live is in Chicago not in New York*); (2) easy rule -- a rule describing the fact that subject-verb inversion is allowed in sentences where adverbials of movement or location are fronted (e.g., *Into the house John ran/ran John*). Four learning conditions were examined: (1) implicit -- learners were asked to memorize sentences; (2) rule-search-- learners were asked to search for the underlying rules; (3) incidental -- learners read sentences for meaning; (4) instructed -- learners were taught with the rules and learned how to apply the rules to the sentences. In this experiment, instructed learners outperformed all others in learning simple rules and implicit learners did not outperform other learners on complex rules.

To sum up, previous studies showed that in learning simple areas, focal attention to target items or structures (often induced by explicit instruction) is more effective than lower level of attention (e.g., mere exposure to instances). However, the answer is less clear for learning more complex area. The studies by Gass, Svetics and Lemelin (2003) and Carroll and Swain (1993) observed strong effect of focal attention in learning complex areas, but in the studies by Dekeyser (1995) and Robinson (1996), this effect seemed to be diminishing because no significant difference was found between the focused attention condition and the non-focused attention condition(s) in learning complex items.

This mixed result can be understood if we view complexity as a continuum, moreover, as a personal continuum (see previous discussion about complexity as an individual issue). At one end of the continuum are the target items that seem very simple to the learners. Learners can characterize the input data themselves, thus the impact of externally driven focal attention is not that strong. In the middle of the continuum there are some aspects that are more complex and require more efforts to figure out. In this case, externally driven focal attention may speed up the natural process. The target items in the experiment by Gass et al. may be something ranging from the simple end to the middle of the continuum, at least to the subjects. Towards the other end of the continuum are some extremely complex items that might be resistant to explicit instruction or learning, at least for some learners. As a result, explicit instruction does not make a difference, as demonstrated in the experiments by DeKeyser and Robinson. A similar idea was expressed by DeKeyser (2003), according to whom, explicit instruction is not necessary when the grammatical rule is very easy, not effective when the rule is very difficult, and effective when the rule is easy, moderately difficult or difficult. In short, at this point, we may suggest that the effect of externally imposed focal attention depends on the side of the complexity continuum the target learning items sit on. However, it is not easy to determine the degree of complexity and the issue is further complicated when complexity is considered as an individual issue.

2.5.4. Attention and proficiency level

There is another issue relevant to the present study, that is, differential effects of attention on proficiency levels, or current state of IL system.

L2 learners' progress is characterized by specific stages of development, with certain structures acquired later than others (Pienemann, 1987, 1989; Pienemann & Johnston, 1986). Although the developmental stages that have been identified cover only a very small part of structures in English and German and even less of other languages, and some features do not seem to have a fixed acquisition sequence (see Lightbown, 1998), there is a clear tendency that forms demanding more processing complexity and capacity (e.g., those involving a lot of manipulation of elements, or discontinuity created by extraction) are acquired later than those that are easier to process (e.g., structures involving less manipulation of elements and respecting continuity) (see Hawkins, 1989; Tarallo & Myhill, 1983; Wolfe-Quintero, 1992). For instance, learners seem to acquire unanalyzed formulas before they are able to move elements around to establish long-distance relationship.

For Pienemann, each developmental stage is a prerequisite for the next, because learner production is constrained by speech-processing strategies that are related to cognitive factors (e.g., perceptual salience and continuity of elements) and learners need to shed certain constraints before they are able to move on to a new stage. Doughty and Williams (1998) pointed out that if learners still need to expend most of their attentional resources for other parts of comprehension or production and have little attention to free up for noticing a particular new form, then focusing on that form will be ineffective. In other words, it is useless to attract learners' focal attention to a form for which they are not developmentally ready yet. In a discussion about the relationship between explicit knowledge (i.e., metalingual and conscious knowledge about language and about the uses to which language can be put) and implicit L2 knowledge (i.e., intuitive and unconscious knowledge which is available for automatic use), R. Ellis (1997) suggested that explicit knowledge derived from formal instruction may be converted into implicit knowledge, but only if the learner has reached a level of development that enables him/her to assimilate the new material. Schmidt (1990) posited that one of the factors influencing noticing is readiness to notice. There are two implications of this claim. First, if a learner is ready to notice some features, then formal instruction can speed up this natural process or perhaps even without pedagogical intervention he/she may notice those features spontaneously. Second, if a learner's attention is directed to something that he/she is not ready to notice, then it might fail to be incorporated into the IL system. In short, all these discussions suggest that a learner's proficiency level is predisposing him/her to be ready to attend to something while ignoring other things, which in turn influences the effect of any externally-imposed focal attention.

A number of experiments have been carried out to investigate the interaction between attention (usually externally driven focal attention) and proficiency.

VanPatten (1990) asked learners of L2 Spanish to count the number of occurrences of a lexical item (noun), a free morpheme (a definite article), or a bound morpheme (third person plural), while comprehending the meaning of the text simultaneously. Lower-level students could not do both types of processing at the same time, but the advanced-level students could process the form and meaning of the noun and article simultaneously, although they could do not do this with the third person plural. This result indicates that advanced learners are more effective input processors.

In a review of experiments that explored the effects of formal instruction, Long (1988) found that even if learners had grasped explicit knowledge about certain linguistic features and also practised, the target structures were still not obvious in communicative language use unless learners were developmentally ready.

Pienemann (1989) conducted a series of studies to examine the effects of instructional intervention on developmental rules (i.e., rules displaying certain acquisition sequence) among young learners of German as L2 and adult learners of German as foreign language. It was found that only those who were at a stage immediately before the stage represented by the target items benefited from the instruction. For learners who were at lower stages, the intervention could bring about confusion, avoidance of the target structures or even caused some learners to perform worse than before.

Williams and Evans (1998) looked at the acquisition of participial adjectives and passives in classrooms by three groups: (1) the flood group -- learners received written input that had been modified to include three times the number of target structures contained in the original material and their teacher deliberately used more target items in discussions; (2) the instructed group -- learners received the same input as the flood group; moreover, their attention was drawn to the target forms as a result of rule explanation and corrective feedback from the teacher; (3) the control group -- learners worked with basically the same materials as the other two groups, but got no instruction or artificial increase in the number of target forms. One interesting result emerged from this experiment: although the instructed group showed greater increases in the accurate use of participial adjectives than the flood and control groups, in terms of passives, the instructed group lost its superiority and the input flood was almost as effective as the instruction. According to the authors, one possible reason for the result is that the passive is more complex than the participial adjective and many participants of the experiment might have just begun to notice the passive and were not yet ready for the learning of the form. This explanation received further support from other data of the study: the students who made the greatest gains after instruction were those who already had some knowledge of the target item (as shown in the pretest); those who had extremely low scores in the pretest generally made little progress after the treatment. Moreover, this pattern could also be observed among the few students who achieved learning gains in the control condition. Williams and Evans viewed this as evidence that learners who are ready to notice may find the relevant data wherever they can even without instruction.

In the experiment by Gass, Svetics and Lemelin (2003), referred to earlier in 2.5.3.2, the researchers questioned the differential effects of attention on both language areas (lexicon, morphosyntax, syntax) and proficiency levels (first-, second- or third-year students in Italian classes at a university). For 1st-year students, [+focused attention] had a significant impact on all language areas. For 2nd-year students, [+focused attention] produced significant results in lexicon, and marginally significant results in morphosyntax and syntax. For 3rd-year students, [+focused attention] produced no significant difference in any of the areas, although the results approached significance for syntax. In short, the focused attention condition appeared to have the greatest effect in early stages of learning, and a diminished role with higher-level learners. As suggested by the authors, one possible reason is that high-level learners have mastered more knowledge of L2 and they can use their own internal resources to find out and understand aspects of the language.

To sum up, we can get two conclusions from previous studies. First, attempts to draw learners' focal attention to certain features are facilitative only when learners are proficient enough to accommodate those features. Otherwise, the attempts will be futile or counterproductive. Second, when learners are ready to learn something, they might notice the relevant features themselves even without external interventions (although external force can speed up the natural process).

2.5.5. The role of negative evidence

This section will focus on the role of NE in SLA. NE is relevant to the issue of attention in the sense that it directs learners' attention to what is impossible or a problem area.

Some studies reported that NE often fails to be noticed by adult learners. For example, Hawkins (1985) found that adult classroom learners often did not perceive NE as such when working with a NS on a problem-solving task. Slimani (1992) observed 6 ESL classes to adult students and found that 36% of the grammatical and lexical items presented by teachers were ignored by students and the majority of them were error corrections. Some studies claimed that students who were corrected demonstrated no gains, or were similar to the comparison group who did not get corrective feedback or corrected less (e.g., Cohen & Robbins, 1976; Robb, Ross & Shortreed, 1986; Semke, 1984).

However, most research showed that NE does facilitate learning.

First, L2 learners not only notice but also benefit from NE, at least in the short term. Wren (1982) found that an advanced adult ESL student could only self-correct 14% of her errors, but during individual tutorial sessions she could correct 83% of the errors in response to a teacher's feedback. Pica (1988) reported that when interlocutors showed signs of noncomprehension, beginning ESL acquirers modified their speech towards the direction of the correct forms 31% of the time; intermediate learners did so 51% of the time in the study by Pica, Holliday, Lewis and Morgenthaller (1989). Lightbown and Spada (1990) presented data from intensive communicative ESL classrooms in Quebec. Learners who received error correction achieved greater accuracy in the production of some of the target structures (e.g., the use of the correct pattern *There is ...* in place of the wrong structure caused by L1 influence **It has...*). The high performance on *there is/are* structure was maintained when learners were tested one year later (Lightbown, 1991). In natural setting, Oliver (1995) found that child L2 learners did make use of the negative feedback from their NS peers in the conversation and the NE was incorporated by the NNS into their IL system.

Second, NE might be required in the sense it can make learners aware of certain deviant forms that are often not noticed through PE. Logically speaking, PE alone can only tell learners what is allowed, but not what is disallowed, and learners seem to need NE to avoid overgeneralizations. Gold (1967) illustrated the following example in English: we can say *The man is sick; I visited the sick man*; however, although *The child is afraid* is OK, * *I comforted an afraid child today* is not. In this case, according to Gold, NE is necessary for those learners who make overgeneralizations to unlearn the errors. White (1991) examined the acquisition of adverb placement restrictions in English by two groups of NSs of French. Before the treatment, both groups accepted SVAO structures as a possible English order as a result of L1 influence. Then one group was given information about the adverb placement constraint in English, while the other was instructed in question formation. After two weeks' instruction, the adverb placement group learned that SVAO was not permitted in English, but the question group did not, although this effect disappeared when participants were tested again one year later. In a follow-up study, Trahey and White (1993) provided two classes with an input flood of the use of English adverbs, which lasted two weeks. The input flood enabled learners to know that SAV order is possible, but it was not sufficient for learners to learn the ungrammaticality of SVAO order. These experiments indicated that NE is required for learners to remove overgeneralization errors, which are caused by an analogy within L2 or with L1.

Another line of research is the differential effects of NE. The following are the major assumptions and findings on this issue.

First, the usefulness of NE may be related to language areas. While dismissing the usefulness of NE in learning syntax, Schwartz (1993) claimed that providing NE in the lexicon and morphology might indeed be successful. According to her, learning the lexicon involves item-by-item learning, the inventory of morphological forms is comparable to those found in the lexicon and "no clustering is posited in these areas" (p159); therefore, NE might be useful for learning the lexicon and morphology. Although previous empirical studies do not support Schwartz' view about the uselessness of NE in learning syntax (see the discussion above), it stands to reason that NE might produce different effects for learning different parts of language, because as reviewed in 2.5.3, focal attention has different effects on different language areas and NE is exactly a means to draw learners' focal attention to a particular area.

Second, the perception of interactional corrective feedback is related to the target of the feedback and the nature of the feedback type. Mackey, Gass and McDonough (2000) found that learners were more accurate in their perceptions about lexical, semantic and phonological feedback than about morphosyntactic feedback. The authors proposed the following reasons to explain this result: (1) in a conversational context, individuals usually focused on meaning rather than form, so morphosyntactic feedback that generally dealt with non-meaning-bearing elements in the experiment was not noticed; on the other hand, phonological, lexical and semantic feedback, which were more often related to meaning, were more likely to be noticed; (2) most of morphosyntactic feedback was provided through recast (i.e., "reformulations of an incorrect utterance that maintains the original's meaning" (Gass & Selinker, 2001, p.458)), which was an implicit type of NE and might be perceived by learners as another way of saying the same thing.

Third, the effectiveness of NE is influenced by proficiency levels. As noted by Spada and Lightbown (1993), "error correction strategies are more effective at different times in learners' development (p219)"; Mackey and Philp (1998) reported that implicit negative feedback in the form of recasts was more effective for advanced learners than beginning learners. The differential effects of NE on proficiency levels might be associated with learners' readiness to notice, understand and assimilate the information passed by the NE (see the discussion about the interaction between attention and proficiency level in 2.5.4).

To sum up, as claimed by Schachter (1991), "the kind of knowledge to be learned, the kind of evidence presented to the learner, the situation in which the learning takes place and the cognitive capabilities of the learner all play a part in the efficient or non-efficient use of negative evidence" (p.99).

2.5.6. Summary of the role of attention in SLA

On the basis of the preceding literature review, we may draw the following conclusions about the role of attention in SLA:

(1) Attention, a continuum from the peripheral to focal, plays a crucial role in SLA.

(2) As far as learning L2 syntax is concerned, many experiments show that noticing, which involves the allocation of focal attention, can facilitate learning. Rule understanding, a higher level than noticing, is not required, but it can promote L2 development at least on some occasions.

(3) As far as learning L2 word meaning is concerned, many experiments show that more

elaborate manipulation and analysis of a lexical item, which requires focal-attentive processing, contributes to the retention of the form-meaning connection.

(4) As far as learning L2 collocation is concerned, very few empirical studies have been carried out to explore the role of attention in this area. Some researchers suggested that learning L2 collocations is predominantly an implicit process that does not require any focal attention to the collocational features per se. But there were also some who maintained that some type of focal attention can enhance the learning of L2 collocations.

(5) Attention can have differential effects on different language areas. The most optimal attentional condition may be different for learning syntax, morphology, lexicon, phonology and pragmatics, and also different for learning simple areas and complex areas. However, we still do not know the exact picture of the differential effects.

(6) The effect of focused attention is mediated by proficiency levels. Any attempt to draw learners' focal attention to certain features in L2, for example, rule explanation or instruction to search for a rule, is effective only when learners are developmentally ready.

(7) On balance, the available evidence indicates that NE promotes L2 learning. However, the perception and usefulness of NE can be influenced by factors like the target of the NE, types of the NE, and learner proficiency levels.

CHAPTER 3

The Present Study

3.1. Research questions

In Chapter 2, I provided an overview of the major issues surrounding the role of attention in SLA, most of which were based on evidence from learning syntax, morphology and basic word meaning. The current study aims to explore some parallel issues in the area of learning L2 collocations. As listed in Chapter 1, there are three research questions, which are repeated here and described in more detail below:

RQ1: Which of the following four attentional conditions leads to the best gains in learning a verb's possible noun collocates?

(1) *semantic processing* ([S]) -- Learners are asked to understand passages that are embedded with non-highlighted target collocations and then their attention is directed towards aspects unrelated to the target collocational features;

(2) *memorization for recall* ([M]) -- Learners are asked to understand passages that are embedded with highlighted target collocations and then they are instructed to memorize the target collocations for a later recall test;

(3) *rule given* ([R]) -- Learners are asked to understand passages that are embedded with highlighted target collocations and then they are provided with the collocational

rules underlying the target items and study how the rules apply to the instances in the passages;

(4) *rule given plus negative evidence* ([R+NE]) -- Learners are asked to understand passages that are embedded with highlighted target collocations and then they are provided with the collocational rules underlying the target items and study how the rules apply to the instances in the passages. Moreover, they are presented with negative evidence, that is, what are impossible noun collocates for the target verbs?

This research question is tied to the following issues: (1) the effectiveness of focused versus peripheral attention to target items; (2) the usefulness of attention at the level of rule understanding; (3) the role of negative evidence. The four experimental conditions, as identified above, are designed to induce four levels of attention, which are largely a consequence of the processing demands of particular task requirement.

It is intended that learners under the *semantic processing* condition have peripheral attention to target collocations, in the sense that they are only exposed to the word sequence but are not consciously searching for any collocational regularities nor chunking out the target combination as a unit. It has to be noted that attention is ultimately what takes place in the participants' brain, not necessarily what the researchers intend it to be. As pointed out by Gass et al (2003), "one cannot rule out the possibility that learners, because of their own individual needs and interests, paid attention to something despite the fact that we did not experimentally draw their attention to that something"(p. 526). Therefore, at this point, it can only be claimed that the *semantic processing* condition aims to limit the possibility of any self-directed focal attention to the target collocations. There are two factors contributing to the achievement of this aim. First, in this condition, learners' attention is drawn towards an aspect that is not directly related to the target collocational features, thus the likelihood of their focal attention to the targets is much reduced, because as reviewed in 2.2., attention is capacity robbing and limited and it is difficult for a learner to do several types of mental processing at the same time, especially when the processing draws on the same resource pool. Second, the internal need to pay focal attention to a word's collocational feature is not strong, because this type of attention is not required for meaning comprehension. For example, once learners know that the basic meaning of *wield* is "to have and use something", they will not have any difficulty in understanding combinations like *wield sticks, wield power*, and there is no need for them to focus on or reflect upon what type of noun frequently follows *wield*. As suggested by Gabrys-Biskup (1992), learners do not make a conscious effort to understand or memorize new collocations, especially those with transparent meaning, since those collocations do not cause any perception problem; as a result, the new collocations very often pass unnoticed, with no or only a weak memory trace left. In short, due to the lack of external direction and internal need, the *semantic processing* group is very likely only paying peripheral attention to the target collocations. This assumption will be further tested in an exit questionnaire (see later description in 3.2.3.3.).

For learners in the *memorization for recall* condition, their attention is directed towards the target collocations through the following means: (1) the target collocations are highlighted in the passages and there is prior instruction which asks them to pay attention to the targets when reading the passages; (2) the memory task encourages learners to chunk the target collocation as a unit rather than merely noticing individual words, which in turn can enhance the long-term storage of the collocations. Compared to the *semantic processing* condition, *memorization for recall* can induce a more focal level of attention to the target collocations. Moreover, learner's knowledge is based more on memory for co-occurring word sequence than on underlying rules, although one cannot preclude the possibility that by repeating those combinations, learners might detect certain patterns.

For learners in the *rule given* condition, their attention is directed towards the target collocations at an even deeper level than the *memorization for recall* condition, that is, attention at the level of rule understanding. Besides input enhancement, there are explicit discussions about the collocational rules, which tell learners how to organize the input. This is likely to facilitate the development of a knowledge base in which the deductive application of rules plays a large part. Meanwhile, it may also lead to the long-term storage of the target instances.

Learners in the *rule given plus negative evidence* condition are supposed to have the deepest level of focal attention to the target items, because besides getting the treatment like that in the *rule given* condition, they are informed of what impossible collocates are, thus their attention is directed towards both the collocational patterns displayed in the positive evidence and the areas where they might make errors.

To sum up, the four experimental conditions *semantic processing*, *memorization for recall*, *rule given* and *rule given plus negative evidence* are designed to elicit four levels of attention to the target collocations respectively: (i) peripheral attention (mere exposure), (ii) focal attention at the level of instance chunking and storage, (iii) focal attention at the level of rule understanding, (iv) focal attention at the level of rule understanding and knowledge of what are impossible combinations.

RQ2: Is the effect of the four attentional conditions mediated by complexity of collocational patterns?

This question is motivated by previous debate over the interaction between attention and complexity of a particular language phenomenon. Two degrees of collocational complexity are investigated: a) a verb collocated with two types of nouns, which can be related to each other by metaphor (e.g., ***wield*** *weapon*, ***wield*** *power*); b) a delexicalised verb accompanied by two types of nouns, which refer to disparate and unrelated things (e.g., ***make*** *some progress*, ***make*** *a speech*). There will be more detailed discussions about this issue in 3.2.2.

RQ3: Does attention have differential effects on different proficiency levels?

This question is inspired by previous discussions about the interaction between attention and learner proficiency level. This study will compare the learning gains of participants from two proficiency levels (see further description in 3.2.1.).

3.2. Method

3.2.1. Participants

101 Chinese students who were non-English majors in a university in China were recruited to participate in this research. The experiment was carried out at the beginning of a spring semester (i.e., the second semester of an academic year). At that time, 49 of the participants were first-year university students who had just enrolled in a college English course (Level 2); 52 were second-year or first-year students who had just

enrolled in a college English course (Level 4)[1]. Before being admitted to the university, all the students had studied English at school for six to nine years[2].

Within each proficiency level, participants were randomly assigned to one of the four attentional conditions as specified in 3.1. The condition assignment procedure went like this: subjects of a particular level seated themselves randomly in a classroom. Then they were asked to count themselves off as A's, B's, C's and D's. A's were put into *semantic processing* group, B's into *memorization for recall* group, C's into *rule given* group, and D's into *rule given plus negative evidence* group (See Mackey & Gass (2005) for description of this method). Because 7 students dropped out during the multiple-session experiment, the actual number of participants who were present throughout the whole procedure and whose data could be used is 94. Table 2 shows the number of participants of each proficiency level and treatment condition.

[1] At the time of the experiment, there were four levels of English courses offered in that university: Level 2, Level 3, Level 4, and Advanced English, with Levels 2-4 having the largest enrollment. In order to recruit as many participants as possible and also maximize the proficiency gap among the learners so that a difference in the treatment effect is more likely to be detected, Level 2 and Level 4 learners were selected for the experiment.

[2] In China, the standard of English teaching in the elementary and middle schools varies greatly with regions. So new students at the university are required to take an English placement test, which determines which level of course they should begin with.

Table 2 Participants information

	semantic processing	*memorization for recall*	*rule given*	*rule given plus negative evidence*	Total
Level 2	13	12	9	10	44
Level 4	13	12	12	13	50
Total	26	24	21	23	94

3.2.2. Linguistic items to be investigated

This study aims to investigate the acquisition of the collocational patterns of four verbs: *wield, warp, make, take.* In the input material presented to the participants, each of the verbs collocated with two types of nouns; moreover, these verbs displayed two degrees of complexity in terms of collocational behavior. The following is a detailed description of the target collocational patterns (see *Collins Cobuild English Dictionary* and *Collins Cobuild English Language Dictionary* for the collocational patterns).

(1) easy type: *wield, warp*

wield occurs with

-- nouns referring to a concrete tool or piece of equipment that can be carried and used (e.g., *stick, weapon, knife*) (The examples in the parentheses are the nouns that appeared in the passages read by the participants. The same is true with the examples isted in the following parentheses.)

-- nouns associated with the concept of power (e.g., *control, power, influence*)

warp occurs with

-- nouns referring to an object that can be damaged by heat or water (e.g., *floor, door, bookshelf*)

-- nouns related to one's mind (e.g., *mind, judgment, view*)

(2) difficult type: *make, take*

make, used as a delexical verb, occurs with

-- nouns related to speech action (e.g., *claim, speech, suggestion*)

-- nouns related to changes (e.g., *change, progress, recovery*)

take, used as a delexical verb, occurs with

-- nouns referring to physical actions (e.g., *look, breath, step*)

-- nouns referring to a particular role, especially one of leadership (e.g., *lead, role, power*)

The collocational patterns of *wield* and *warp* are considered as easier to acquire than those of *make* and *take* for the following two major reasons:

The first reason lies in the difficulty in figuring out the target patterns. When learners encounter various noun collocates of *wield* and *warp*, the contrast between nouns denoting concrete objects and those about abstract concepts can be quite salient, for instance, *stick/weapon/knife* vs. *control/power/influence*. This salient distinction enables learners to divide the possible collocates into two clear-cut categories from the very beginning, a process that can facilitate the further detection of what specific type of concrete or abstract noun can be associated with the verb. However, for the noun collocates of *make* and *take* targeted in this research, there is no such salient distinction; moreover, there are no close synonyms among them, which may further impede the clustering and categorization process. For instance, the noun collocates of *take* shown to the participants were *look, lead, breath, role, step, power.* All of them are about something not tangible and there is no synonymous relationship between any two of them. In this case, learners might not be exactly sure about how to classify these noun collocates, at least not at the beginning. To confirm this assumption about the difficulty in discovering the underlying collocational patterns, three English teachers in China, who are NNSs of English, were presented with all the target verb-noun collocations and asked to rank the difficulty in classifying the noun collocates of each of the four verbs. All of them agreed that it was easier to make the classification for *wield* and *warp* than for *make* and *take.*

The second reason for the distinction is related to the difficulty in storing the patterns in LTM. The two types of noun collocates of *wield* and *warp*, one concrete and the other abstract, can be easily associated with each other through metaphor. For instance, both *power* and *weapon* can follow *wield,* and *power* can be regarded as a type of *weapon*. This metaphorical relationship can facilitate the retention of the two types of collocates. However, for the delexical use of *make* and *take*, the two types of noun collocates targeted in the study are unrelated with each other. For instance, the noun collocates of *make* --*speech* and *change* -- refer to two disparate things. Obviously, it is more difficult to encode two unrelated items in LTM and associate them with one verb than to store two related items. Moreover, as previously described, in their delexical use, the basic meaning of *make* and *take* is somewhat reduced, so the semantic connection between a delexical verb and its following noun is quite loose, which can make the long-term storage of the combination even harder.

In fact, besides the above two reasons, which are related to semantic complexity, there is another factor that causes the collocational features of *make* and *take* to be more difficult to learn, that is, the two verbs can take numerous types of nouns. However, to avoid confounding these two factors (the difficulty in acquiring a particular pattern and the quantity of patterns to be acquired), this study will only target two collocational patterns for each of the four target verbs.

Moreover, since participants surely knew *make* and *take* before the experiment, in order to ensure that any learning gain is a result of the experimental treatment rather than other sources, pseudo-forms *voke, dain, mand, nert* were used to replace *wield, warp,* *make* and *take*. The meaning and collocational behavior of the pseudo-word are identical with its real counterpart, and the difference only lies in form. These pseudo-words were created and matched with the real ones on the basis of the following criteria so that they look more like real English words and the negative effect caused by the use of artificial words could be minimized: first, each form is a stressed syllable of a real English word (*provoke* → *voke*, *disdain* → *dain*, *command* → *mand*, *inert* → *nert*); second, all forms are of CVC or CVCC phonological structure, just like *wield*, *warp*, *make* and *take*; third, matching of the pseudo-forms with the real ones was randomized so that it was different across the four attentional conditions and across the two proficiency levels (see Table 3).

Table 3 Matching of the pseudo-forms with the real words

	semantic processing	*memorization for recall*	*rule given*	*rule given plus negative evidence*
Level 2	Matching method A	Matching method B	Matching method C	Matching method D
Level 4	Matching method C	Matching method D	Matching method A	Matching method B

Note:
Matching method A: *mand* = *wield*, *nert* = *warp*, *voke* = *take*, *dain* = *make*
Matching method B: *mand* = *make*, *nert* = *wield*, *voke* = *warp*, *dain* = *take*
Matching method C: *mand* = *take*, *nert* = *make*, *voke* = *wield*, *dain* = *warp*
Matching method D: *mand* = *warp*, *nert* = *take*, *voke* = *make*, *dain* = *wield*

3.2.3. Material and procedure

The experimental procedure consisted of three parts: treatment (Day 1 to Day 3), test

(Day 4) and exit questionnaire (immediately after the test). In order to make the following description of the material and procedure easier to understand, I will use *wield, warp, make* and *take* when illustrating examples, although in the material used by the participants, these words were actually replaced by pseudo-forms *mand, nert, voke* and *dain.*

3.2.3.1. Treatment

The treatment lasted three consecutive days. Every day all the participants were asked to complete four tasks: (1) reading two passages that contained the target collocations, (2) doing reading comprehension exercises, (3) doing an exercise that helped them review the basic meaning of the four target verbs, (4) doing an exercise that aimed to manipulate their attention to the target collocations in different ways. The following part will describe each task in more detail:

(1) Task 1 -- reading passages

Task 1 asked participants to read two passages, each of which contained 230-341 words. Passage 1 included one collocational pattern of each of the four target verbs, and Passage 2 included the other collocational pattern of each verb. Table 4 displays the distribution of the targets in the passages:

Table 4 Distribution of target collocations in the reading passages

		wield	*warp*	*make*	*take*
Day 1	**Passage 1**	*wield sticks*	*warp the floor*	*make no changes*	*take a look*
	Passage 2	*wield control*	*a warped mind*	*make the claims*	*take the lead*
Day 2	**Passage 1**	*wield weapons*	*warp the front door*	*make a speech*	*take a deep breath*
	Passage 2	*wield power*	*warp his judgment*	*make slow progress*	*take the role*
Day 3	**Passage 1**	*wield great influence*	*warp bookshelves*	*make some suggestions*	*take a step*
	Passage 2	*wield knives*	*warp a person's view*	*make a full recovery*	*take power*

Moreover, for all the participants, the basic meaning of the target verbs was provided in English in the margin. The reason for the margin glossing is as follows: vocabulary learning typically proceeds from a word's core meaning to the more refined collocational knowledge (Henriksen, 1999; Schmitt, 2000), so it is more meaningful to analyse the collocation data from the students who have acquired the basic meaning; in order to increase the amount of usable data in this study, margin glossing, a way of promoting noticing of a new word and subsequent meaning acquisition, was used; otherwise, learners might simply ignore the new word because it might not be crucial for the comprehension of the whole text or the aim of a specific exercise. Table 5 shows the basic meaning of the target verbs that was provided to the participants.

Table 5 Glossing for the target verbs

target word	basic meaning
wield	to have and/or use something
warp	to change something for the worse
make	to produce something
take	to get something

Note: The reference for the basic meaning of the target verbs comes from *Cambridge International Dictionary of English, Longman Dictionary of Contemporary English*, and *Encarta World English Dictionary*.

The content of the passages was the same for all the attentional groups. But the instruction for the *memorization for recall*, *rule given* and *rule given plus negative evidence* groups asked learners to pay attention to the target verbs and their noun collocates, which were highlighted in the passages. The *semantic processing* group did not get this type of instruction or textual enhancement.

(2) Tasks 2 and 3

Task 2 asked learners to answer some questions related to the main idea of the passages. Task 3 asked learners to match five words (including the four target verbs) with five provided meanings. Like margin glossing, Task 3 aimed to encourage learners to process the basic meaning of the target verbs and increase the amount of data that could be used for further analysis of collocation. When learners did tasks 2-3, they could go back to the corresponding passages for answers. The content of Tasks 2 and 3 was the same for all the groups.

(3) Task 4 – attention manipulation exercise

After finishing Tasks 1, 2 and 3, learners of different attentional conditions were asked to do different exercises, which exposed them to the target collocations again, yet aimed to elicit different levels of attention to the targets.

For the *semantic processing* group, the sentences containing the target verbs were picked out from the passages and presented to learners according to the order they appeared in the passages. Participants were asked to read those sentences and find a word with a particular meaning. The correct answer was a word after the target word. For instance,

1. Rebels surrounded a government building, while wielding sticks and throwing stones. *In this sentence, which word means "to cause something to move rapidly through the air"?* ___________

2. Tips about how to prevent heat from warping the floor are available on the Internet.

   *In this sentence, which word refers to "a computer network"?*___________

   ...

This design aims to make students read the target collocations again, but without paying focal attention to the target collocational features.

For the *memorization for recall* group, the sentences containing the target verbs were also picked out from the passages and presented to learners, but with those containing the same target verb grouped together. Learners were asked to memorize the highlighted target collocations for a later recall test, without using paper or pencil. For example,

1. Rebels surrounded a government building, while ***wielding sticks*** and throwing stones.

2. It makes me feel like someone is trying to ***wield control*** over us.

...

For the *rule given* group, learners were provided with the rules underlying the target collocations, as those stated in 3.2.2, and asked to find out how the target collocations displayed in the passages matched these rules. For example,

I. wield

In the two passages, the verb *wield* is followed by **TWO** types of nouns:

Type 1: nouns referring to a tool or a piece of equipment that can be carried and used.

Type 2: nouns related to the concept of power.

For instance,

1)...rebels who surrounded a government building, while ***wielding sticks*** and throwing stones...

In this sentence, the noun following *wield* falls into Type ___, that is, nouns about ____.

2) It makes me feel like someone is trying to ***wield control*** over us.

In this sentence, the noun following *wield* falls into Type ___, that is, nouns about ____.

Do you think the two types of nouns are somewhat related to each other? If yes, in what way? ____.

In order to make the exercise more interesting and challenging, on Day 2, the collocational rules were not explicitly given to the *rule given* group. Instead, learners were asked to recall and complete the target rules they learned on Day 1 with the help of sample sentences from the passages. For example,

I. wield

In the passages, the verb *wield* is followed by TWO types of nouns:

Type 1: nouns referring to a _____ or a piece of ________that can be carried and _______.

Type 2: nouns related to the concept of _____________.

Are the two types of nouns somewhat related to each other? If yes, in what way?

____

The following two sentences from the passages might help you fill in the blanks above.

1) All kinds of horrible scenes occurred to her mind: men ***wielding weapons*** or taking away victims by force ...

2) It seems that he always wants to ***wield power*** over me.

For the *rule given plus negative evidence* group, in addition to the treatment like that in the *rule given* group, learners were also provided with negative evidence which showed that some noun collocates were inappropriate for the target verb, although they were semantically compatible with the basic meaning of the verb. For *wield* and *warp*, learners were informed that, generally speaking, when the verb is used in the basic meaning as shown in the passages, it is followed ONLY by two types of nouns. (This type of statement was not applicable to *make* and *take*, due to their collocationally active nature.) Moreover, for all the four target verbs, participants were told that a particular sentence was bad and asked to think about the reason. For example,

Notice you CANNOT say:

**He wields a new method to teach his students.*

Why do you think is this sentence bad? ______________________________

Table 6 summarizes the negative evidence presented to the *rule given plus negative evidence* group from Day 1 to Day 3:

Table 6 Summary of negative evidence

	wield	*warp*	*make*	*take*
Day 1	**wield low prices*	**warp his health*	**make two novels*	**take a lot of comment from*
Day 2	**wield $100*	**his performance ... has been warped*	**make a lot of articles*	**take any response from*
Day 3	**wield a new method*	**the environment... has been warped*	**make a very good idea*	**take any help from*

To sum up, during the treatment all the participants encountered a target verb's collocations 4 times every day (2 times in reading passages and 2 in the attention manipulation exercise). The difference lay in the level of attention to the target collocations.

Before the material was used by the participants, it was proofread by three NSs of English, with the pseudo-forms re-written as their real counterparts. Any parts regarded as inappropriate by more than one NS was modified according to their suggestions. Appendices A, B, C and D[3] show the three-day treatment material presented to the *semantic processing*, *memorization for recall*, *rule given*, and *rule given plus negative evidence* groups respectively. Table 7 is a summary of the daily treatment procedure from

[3] The material shown in the appendices is the version in which *mand, nert, voke* and *dain* match *wield, warp, take* and *make* respectively.

Day 1 to Day 3.

Table 7 Daily treatment procedure (Day 1 to Day 3)

Treatment	*semantic processing*	*memorization for recall*	*rule given*	*rule given plus negative evidence*
7 minutes	1. Read two passages	1. Read two passages (instructed to pay attention to the highlighted target collocations)	1. Read two passages (instructed to pay attention to the highlighted target collocations)	1. Read two passages (instructed to pay attention to the highlighted target collocations)
5 minutes	2. Answer comprehension questions	2. Answer comprehension questions	2. Answer comprehension questions	2. Answer comprehension questions
1 minute	3. Match the target verbs with their corresponding meaning	3. Match the target verbs with their corresponding meaning	3. Match the target verbs with their corresponding meaning	3. Match the target verbs with their corresponding meaning
5 minutes	4. Find a word with a particular meaning (not the target verb) from the sentences containing the target collocation	4. Memorize the target collocations for a later recall test	4.a) Rules underlying the target collocations are presented; b) Find out how the use of the target verbs in the passages matches these rules.	4.a) Rules underlying the target collocations are presented; b) Find out how the use of the target verbs in the passages matches these rules; c) NE is provided.

3.2.3.2. Test and scoring

The day after the completion of the treatment, that is, on Day 4, participants did a test (see Appendix E), which consisted of three parts, testing three aspects of learning gains: (1) knowledge of the basic meaning of the target verbs, (2) collocation production, (3) collocation judgment.

Part I of the test. Part I of the test was a multiple-choice exercise, which asked learners to choose a word or phrase that had a meaning closest to that of the target verb, for example,

warp ____ a) to make (something) worse b) to divide (something) into parts

c) to look for d) to go through

The maximum score for Part I was 4, with 1 point for each target verb. This part aims to see whether learners had acquired the basic meaning of the target verbs. If and only if the basic meaning was acquired, the acquisition of the target collocational patterns (i.e., data from Parts II and III of the test) was further analysed.

Part II of the test. Part II asked learners to write down as many noun collocates as possible for each of the target verbs within 4 minutes. Learners' production was divided into four types: (1) old collocates, that is, collocates that appeared in the passages read by the participants; (2) new target-like collocates, that is, collocates that followed the target rules and did not appear in the passages; (3) non-target-like collocates, that is, collocates that did not follow the target rules; (4) semi-target-like collocates, that is, collocates that were half way between consistent and inconsistent with the target rules. An English teacher in China and the primary researcher (both NNSs of English) worked on the classification of the IL production. When their opinion differed, another English teacher in China, who was also a NNS of English, was consulted, and the majority opinion was adopted. The number of collocates for each type was calculated and compared across the four attentional conditions.

Moreover, as mentioned in the literature review, collocational rules can be probabilistic; for *make* and *take*, their possible collocates are far beyond the types targeted in the current study. As a result, in the test, there were occasions when the IL production followed the target rules but was not accepted or commonly used by NSs or when the production did not follow the target rules but was accepted by NSs. Therefore, two NSs of English were asked to determine if the collocates produced were (1) good, (2) bad, or (3) OK but not the best way to say it, with the pseudo-forms replaced by their real counterparts. When the judgment of the two NSs differed, another NS was consulted and the majority opinion was adopted.

Part III of the test. Part III asked learners to judge whether a sentence was a possible English sentence or not. If bad, learners were supposed to identify the error[4]. (When

[4] In the original design, Part III of the test also asked learners to translate the sentences into Chinese if they considered them good. However, in a similar study on L2 verb-noun collocations by Fan (2004) (more details about this study in Chapter 5), it was found that once learners acquired the basic meaning of the target verbs, they did not have difficulty in translating the sentences they correctly judged as good. So in order to reduce experiment time and subject fatigue, the translation part was omitted in the current design.

learners did Part III, they were not allowed to change the answers in Part I or II.) All the sentences contained a good or bad verb-noun phrase of one target verb. For each of the 4 target verbs, there were 5 sentences, 2 with a good collocation, 2 with an inappropriate collocation and 1 with a nonsense collocation.

The good collocations represented the two collocational patterns displayed in the treatment input, but were not the same as those that appeared in the passages read by the participants (see Table 8).

Table 8 Sentences with a good collocation in the judgment test

wield	He is so well trained that he can wield these heavy swords with ease. He doesn't seem to know how to wield authority.
warp	The wood is warped by damp conditions. Years of living alone have warped her personality.
make	He made the shortest speech I have ever heard. Jack made a shift in his political views.
take	After dinner, Mary took a walk in the park. The actor wanted to take the part of Hamlet.

The bad collocations contained in the sentences for judgment were deviant from the target rules, although the noun collocate was compatible with the basic meaning of the target verb. Moreover, those bad collocations were semantically parallel to the negative evidence provided to the *rule given plus negative evidence* group during the treatment, in the sense that the tested bad noun collocate and the one shown in the negative evidence had a synonymous or hyponymy relationship, or belonged to the same lexical field. For instance, the *rule given plus negative evidence* group was informed that they could not say **He wields a new method to teach his student*, and the judgment test included this parallel sentence: **The company wielded a new marketing strategy to sell its product*. In the two sentences, the inappropriate noun collocates, *method* and *strategy*, were near-synonyms. Table 9 displays the sentences with a bad collocation in the judgment test.

Table 9 Sentences with a bad collocation in the judgment test

wield	*The girl wielded several methods to solve the problem. * The man wielded his own money to support these poor children.
warp	*The company's operations have been warped since the new manager came. *The air quality in this area has been warped by the pollution from the factories.
make	*Mary made great interest in music. *The writer made two books last year.
take	*He didn't take any reply from his girlfriend. *He didn't take any support from his family.

To sum up, there were altogether 20 sentences for judgment, 8 with a good collocation, 8 with an inappropriate collocation and 4 with a nonsense collocation. When learners made a correct judgment, judging a good collocation as good or judging a bad collocation as bad for the reason intended by the researcher, that is, recognizing the inappropriateness of the target verb-noun combination, they got 1 point, otherwise 0 point. The maximum score for the judgment of good collocations and bad collocations was both 8 points.

Before the experiment, all the sentences for judgment, with the pseudo-forms re-written as their counterparts in real English, were read by 2 NSs of English to ensure that they fell into the right category, that is, they are sentences with a good or bad collocation.

3.2.3.3. Exit questionnaire

Immediately after the test, participants were asked to answer some questions in English or Chinese. There were altogether three questions and each attentional group answered some of them.

The first question was for the *semantic processing* group only: "When you read the passages in the past three days, did you pay special attention to the nouns or noun phrases that follow *nert, voke, mand* or *dain*?" This aims to see whether it is true that learners in that condition did not pay any focal attention to the target collocations as supposed by the researcher.

The second question was for the *semantic processing* and *memorization for recall* groups: "When you read the passages, did you feel that *nert, voke, mand* and *dain* had always been followed by particular TYPES of nouns? If yes, please write down what you noticed for each of the four words." This aims to see to what extent learners under the two non-rule-oriented conditions could detect the underlying collocational rules on their own.

The third question was for the *rule given* and *rule given plus negative evidence* groups: "In the past three days, you were informed about what TYPES of nouns follow *nert, voke, mand* and *dain*. Please write down these patterns." This aims to see how much rule knowledge is actually gained by learners under the two rule-oriented conditions, and how the recall of rules is related to learners' performance in the test.

3.3. Research hypotheses

There are altogether 6 research hypotheses concerning the effect of attention. Hypothesis 1 is about acquisition of the basic meaning of the target verbs; hypotheses 2 to 4 are related to the production of collocates; hypotheses 5 and 6 are about judgment of collocational well-formedness.

Hypothesis 1. Attention to collocational features does not have a significant main effect on acquisition of the target verbs' basic meaning. During the 3-day treatment, all the participants, whatever their level of attention to the target collocations, encountered each of the four target verbs for at least 5 times per day and also did a daily exercise focusing on the basic meaning of these verbs. These encounters and exercises are very likely sufficient for learners to notice the four words (although not necessarily their collocational features) and retain the form-meaning associations.

Hypothesis 2. In terms of producing old collocates for the target verbs (i.e., collocates that appeared in the passages), the *memorization for recall*, *rule given* and *rule given plus negative evidence* groups will significantly outperform the *semantic processing* group. And this trend will be found among students of both proficiency levels and for both easy and difficult collocational rules.

The reasons are as follows: The treatment in the *memorization for recall* condition directly encourages the storage of target collocations in LTM. The rules provided in the *rule given* and *rule given plus negative evidence* conditions can help learners organize the target phrases in the input, elicit focal attention to them and thus promote memorization, although participants might not intentionally try to memorize those target collocations. For lower-level students, very complex collocational rules, that is, those of *make* and *take*, might be less effective as an input organizer, but the rule-oriented treatment can still induce focal attention to the target collocations and increase chances of LTM storage. As to the participants in the *semantic processing* condition, their attention to the target collocations is very likely peripheral (see previous discussion in 3.1.), and as a result, their memory trace of the target collocations tends to be the weakest.

Hypothesis 3. As to new target-like collocates (i.e., collocates that follow the target rules and did not appear in the passages), generally speaking, the *rule given* and *rule* *given plus negative evidence* groups will write significantly more of this type of collocates than the *memorization for recall* and *semantic processing* groups. However, for lower-level students learning complex collocational patterns, that is, those of *make* and *take*, there might be no significant difference between the two rule-oriented groups and the two non-rule-oriented groups.

This hypothesis is based on the following rationale Rules presented to the *rule given* and *rule given plus negative evidence* groups can serve as an aid for making generalizations to novel cases. As to the *memorization for recall* and *semantic processing* groups, it is quite hard for them to find the correct target rules. The *memorization for recall* group might detect certain underlying rules as a result of repeating the phrases, but the amount of input provided to them might not be enough for the learners to induce the correct target rules. The *semantic processing* group might not sense any recurrent patterns at all because of a lack of focal attention to the targets. Therefore, the two rule-oriented groups will enjoy more advantages than the two non-rule-oriented groups in terms of making target-like extensions. However, for lower-level students, complex rules of *make* and *take* might be too hard for them to acquire and thus less useful as the basis for transfer, so in this case, the superiority of the two rule-given conditions might not exist. In other words, I view the collocational rules of *make* and *take* as sitting on the "too confusing" side of the complexity continuum for the lower-level participants (see literature review 2.5.3).

Hypothesis 4. In terms of non-target-like collocates, that is, collocates that do not follow the target rules, generally speaking, the *rule given plus negative evidence* group will write significantly fewer of this type of collocates than the *rule given* group, which in turn will write fewer than the *memorization for recall* and *semantic processing* groups. However, the significant difference among the four attentional conditions might not hold for lower-level students learning complex collocational patterns.

The following are the reasons for this hypothesis. Positive evidence alone only explicitly tells learners which sentences are possible, but not which sentences are impossible. Negative evidence can fill in this gap, help learners narrow down their hypothesis and be more conservative and cautious about a word's possible collocates, so the *rule given plus negative evidence* group will produce the fewest non-target-like extensions. For the *rule given* group, although there is no explicit information about what is not allowed, the revealed recurrent patterns might serve as a type of indirect negative evidence, which makes learners somewhat prefer to observe the patterns in the input. As to the two non-rule-oriented groups, due to the failure in discovering the target rules, very likely there will be more production that violates the target rules. However, it has to be noted that, as previously mentioned, for lower-level students, the complex collocational rules of *make* and *take* are hard to acquire, so in this case the rule-oriented treatment might be less effective and the difference among the four attentional conditions can disappear.

Hypothesis 5. In terms of judging good collocations, attention to target collocational features does not have a main effect. As stated in Hypothesis 1, all the participants will have acquired the basic meaning of the four target verbs, so the good collocations, in which the noun collocate is semantically compatible with the basic meaning of the target verb, tend to be accepted by all the learners, and there won't be significant difference among the four attentional conditions.

Hypothesis 6. In terms of judging bad collocations, generally speaking, the *rule given plus negative evidence* group will outperform the *rule given* group, which in turn will outperform the *memorization for recall* and *semantic processing* groups. However, again the significant difference among the four attentional conditions might not hold for lower-level students learning complex collocational patterns. The reasons for this hypothesis are the same as that stated in Hypothesis 4.

Table 10 presents a summary of these research hypotheses.

Table 10 A summary of research hypotheses

Tasks in the test	The effect of attention to the target collocations
Acquisition of the meaning of the target verbs	no main effect
Production of old collocates	[M], [R], [R+NE] >S
Production of new target-like collocates	[R], [R+NE] > [M], [S] but for lower-level participants learning complex rules, no main effect
Avoidance of non-target-like collocates in production	[R+NE] > [R]> [M], [S] but for lower-level participants learning complex rules, no main effect
Judgment of good collocations	no main effect
Judgment of bad collocations	[R+NE] > [R]> [M], [S] but for lower-level participants learning complex rules, no main effect

Note:

[S] = *semantic processing* condition, [M] = *memorization for recall* condition,

[R] = *rule given* condition, [R+NE] = *rule given plus negative evidence* condition;

The ">" mark between conditions indicates more superior performance, and the "," mark indicates no significant difference.

CHAPTER 4

Results

This chapter will report the results of the experiment in seven parts:

(1) acquisition of the basic meaning of the target verbs;

(2) production of collocates of the target verbs;

(3) judgment of collocations of the target verbs;

(4) summary of the test results;

(5) detection of target rules by the *semantic processing* and *memorization for recall* groups;

(6) recall of target rules by the *rule given* and *rule given plus negative evidence* groups;

(7) participants' performance during the three-day treatment.

The first four parts focus on the results of the experiment. The fifth and sixth parts are related to the exit questionnaire. And the last part aims to characterize learners' answers to some of the major exercises during the three-day treatment, which can be helpful to our interpretation of the test results. In order to simplify the report, the target words in the experiment are written as *wield, warp, make* and *take* in this chapter rather than the original pseudo-forms.

4.1. Acquisition of the basic meaning of the target verbs

Research Hypothesis 1 states that attention to collocational features does not have a significant main effect on acquisition of the target verbs' basic meaning. This hypothesis is confirmed by the result. In the first part of the test, which examined knowledge of the basic meaning of the target verbs, all the participants got 4 points, the maximum score. In other words, after the treatment, learners in all the attentional conditions acquired the basic meaning of the target verbs, and different levels of attention to the target collocations did not produce significantly different results in terms of learning basic word meaning.

4.2. Production of collocates of the target verbs

The second part of the test asked participants to produce as many noun collocates as possible for the four target verbs within 4 minutes. Perhaps due to a misunderstanding of the task requirement, 3 learners wrote down the meaning or collocational rules of the target verbs rather than possible collocates. So their data could not be used and the actual pool for this part was 91 participants. The results of the collocate production will be reported according to this outline:

(1) classification of the IL production: procedure and method;

(2) an overall picture of the collocate production;

(3) production of old collocates;

(4) production of new collocates -- overall comparison;

(5) production of new target-like collocates;

(6) production of non-target-like collocates;

(7) production of semi-target-like collocates;

(8) summary of collocate production;

(9) NS judgment of IL production.

4.2.1. Classification of the IL production: procedure and method

As described in Chapter 3, learners' production of collocates was classified into old and new collocates according to whether they appeared in the passages read by the participants or not. And the new collocates were further sub-categorized into three types: (i) new target-like collocates (new collocates that follow the target rules); (ii) non-target-like collocates (collocates that do not follow the target rules); (iii) semi-target-like collocates (collocates that are half-way between consistent and inconsistent with the target rules). This section will describe the method of assigning the IL production to each category, which was determined on the basis of the available data.

The first problem encountered in the process of classification was how to deal with the formal errors produced by some learners. When writing the noun collocates, some learners misspelled a word or misused a morpheme, for example, *occasion* was rendered as **occassion*, *speech* as **speach*, *comprehension* as **compehension*, *excitement* as **exciteness*, *suggestion* as **suggests*, and *alternation* as **altering*. Since the major aim of the production test was to examine participants' knowledge about what MEANING determined the compatibility of nouns with the target verb, formal errors were not taken into account. There was only one occasion when it was quite hard to guess what the learner meant with a misspelled word, that is, **fance*, which was produced for *take*. This single case was excluded from the analysis.

After formal errors were modified, the collocates were divided into old and new. This was not a difficult process. The more challenging task was the further classification of the new collocates, which was done by two raters, with an interrater reliability calculated at 97.26% (320 out of 329 types of new collocates). As to the 9 disagreements, as described in Chapter 3, a third rater was consulted and the majority opinion was adopted. The following were the criteria used by the raters to make the classification.

(1) Collocates of *wield*:

Rule 1 --- nouns referring to a concrete tool or piece of equipment that can be carried and used.

If the noun produced for *wield*, like the target nouns in the reading passages, had both of the following semantic features, it was regarded as consistent with the rule (i.e., target-like): [which is typically used as a weapon or a tool for making or repairing something], [which can be carried, that is, used with one's hands]. For example, *gun, hammer, sword, saw, screwdriver.*

Moreover, there were two groups of nouns, which were hard to judge whether they were completely consistent or inconsistent with this target rule. In the first group, the nouns denote certain concrete objects that can be carried and are not typically used as weapons or tools, but may be used for these functions, for example, *pen, pencil, book, umbrella, cup, glass.* These nouns were labeled as semi-target-like (1), that is, nouns sharing partial semantic features with the target noun collocates ((1) indicates the first type of semi-target-like collocates). In the second group, the nouns produced reflect some general terms that semantically dominate the target-like nouns, or are superordinates of the target-like nouns, for instance, *tool, equipment, machine, apparatus, instrument, device.* This group of nouns was classified as semi-target-like (2) ((2) indicates the second type of semi-target-like collocates).

Rule 2 -- nouns associated with the concept of power.

If the noun produced for *wield* met ONE of the following standards, it was considered as consistent with the target rule: (i) the noun is a synonym of one of the target noun collocates in the reading passages (i.e., *control*, *power*, *influence*), for example, *force, strength, authority, energy* (*Chamber's Dictionary of Synonyms and Antonyms* was used for reference); (ii) the noun's definition involves the concept of power, for example, *violence* (definition: extreme force), *leadership* (definition: the action of leading a group of people or an organization) (*Cambridge International Dictionary of English* and *The New Oxford Dictionary of English* were used for reference).

If the noun produced for *wield* was consistent with neither of the two above rules, it was categorized as non-target-like, for example, *car, classroom, library, money, water, essay, source, idea, time, method, thought, relationship, chance, impression.*

(2) Collocates of *warp*:

Rule 1 -- nouns referring to an object that can be damaged by heat or water.

When asked to write down noun collocates for *warp*, the participants produced many nouns referring to concrete objects. It was found that all these objects could be damaged by heat or water. However, some of the nouns (e.g., *desk, shelf, table, chair*) obviously have a closer semantic relationship with the three target nouns in the reading passages (i.e., *bookshelf, floor, door*), in that all of them are very often made of wood. Some of the nouns produced by the participants (e.g., *book, food, paper, road*) do not share this semantic feature with the target nouns. In order to differentiate the two types of production, nouns with ALL of the following semantic features were categorized as target-like: [concrete objects], [which can be damaged by heat or water], [which is often made of wood], for example, *desk, shelf, table, chair, stick, board, cabinet* (see *Cambridge Dictionary of American English*). Nouns that met all the features except the third one were categorized as semi-target-like (1), for example, *book, paper, car, picture, plastic, steel, water.*

Moreover, like *wield*, participants also produced some general terms which were difficult to judge whether they completely complied with the target rule or not, for example, *thing, object.* These general nouns were classified as semi-target-like (2).

Rule 2 -- nouns related to one's mind.

If the noun produced for *warp* denoted or involved certain mental activities, it was regarded as consistent with this rule, for example, *decision, emotion, mood, thought, belief, feeling.*

If the noun produced for *warp* did not meet either of the two above rules, it was regarded as non-target-like, for example, *atmosphere, condition, consequence, environment, performance, situation.*

(3) Collocates of *make*

Rule 1 -- nouns related to speech action.

Rule 2 -- nouns related to changes.

If the noun produced for *make* denoted speech action (e.g., *talk, advice, lecture, comment, statement*), or expressed a kind of change (e.g., *alteration, destruction, revolution, improvement*), it was considered as target-like. Otherwise, it was non-target-like (e.g., *idea, machine, influence, product, book, method, power, story*).

(4) Collocates of *take*

Rule 1 -- nouns referring to physical actions.

Rule 2 -- nouns referring to a particular role, especially one of leadership.

If the noun produced for *take* described certain physical action (e.g., *blow, fall, gaze, jump, kick, sigh, touch*), or was a synonym of *lead, role,* or *power*, three of the target nouns in the reading passages (e.g., *a part (in a play), leadership*), it was classified as target-like. Otherwise, it was non-target-like (e.g., *money, book, help, idea, chance, job, support, box, car*).

To sum up, the collocates produced by participants were divided into old, new target-like, non-target-like, semi-target-like (1) and semi-target-like (2). Before looking at the production details of each sub-type of collocate, I will first present a general picture of the collocate production.

4.2.2. An overall picture of the collocate production

4.2.2.1. Number of collocates

Table 11 and Figure 1 show the mean number of collocates produced by participants by complexity * level * attention, in which "simple" represents the simple collocational behavior of *wield* and *warp*, "complex" represents the complex collocational behavior of *make* and *take*, and [S], [M], [R] and [R+NE] represent the *semantic processing, memorization for recall, rule given* and *rule given plus negative evidence* conditions respectively. These abbreviations will also be used in the other tables and figures.

Table 11 Descriptive statistics of quantity of collocate production by complexity * level * attention

Complexity	Level	Attention	Mean	Std. deviation	N
Simple	2	[S]	5.9167	4.20948	12
		[M]	4.5455	2.16165	11
		[R]	7.5000	3.25137	8
		[R+NE]	5.0000	2.05480	10
	4	[S]	5.3077	4.42313	13
		[M]	5.6667	1.66969	12
		[R]	8.7500	2.52713	12
		[R+NE]	10.0769	1.84669	13
Complex	2	[S]	5.8333	3.24271	12
		[M]	4.1818	1.99089	11
		[R]	6.3750	4.53360	8
		[R+NE]	4.4000	1.64655	10
	4	[S]	4.5385	3.84308	13
		[M]	4.8333	1.80067	12
		[R]	4.7500	2.34036	12
		[R+NE]	6.7692	2.83296	13

Note: mean= mean number of collocates produced;
N= number of participants.

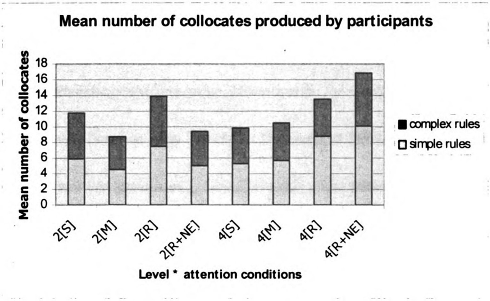

Figure 1 Mean number of collocates produced by participants

An analysis of variance (ANOVA) of the number of collocates was performed, with attention and level as two between-subjects factors and complexity as a within-subjects factor (All the statistical tests were performed on SPSS 13.0 statistical software and the alpha level was set at 0.05). There were three major findings from the test:

(1) Level did not have a significant main effect ($F(1, 83) = 2.239$, $p = .138$, partial Eta squared (η_p^2)= .026);

(2) Complexity had a significant main effect ($F(1, 83) = 38.751$, $p = .000$, $\eta_p^2 = .318$), with the collocates produced for *wield* and *warp* (simple rules) being significantly more than the collocates for *make* and *take* (complex rules);

(3) Attention had a marginally significant effect ($F(3, 83) = 2.697$, $p = .051$, η_p^2

= .089). As shown in Table 11 and Figure 1, in general, the *rule given* and *rule given plus negative evidence* groups tended to produce the greatest number of collocates, which was followed by *semantic processing* group. *Memorization for recall* group produced the fewest collocates. Post-hoc Least Significant Difference (LSD) test revealed significant difference between *memorization for recall* and *rule given*, between *memorization for recall* and *rule given plus negative evidence*, with the memorization group producing significantly fewer collocates than the two rule-oriented groups (see Table 12).

Table 12 Post-hoc LSD test of the effect of attention on the number of collocates

Attention	Attention	Mean difference	Std. Error	Sig.
[S]	[M]	.5539	.78984	.485
	[R]	-1.4450	.82011	.082
	[R+NE]	-1.4243	.78984	.075
[M]	[S]	-.5539	.78984	.485
	[R]	-1.9989(*)	.83581	.019
	[R+NE]	-1.9783(*)	.80613	.016
[R]	[S]	1.4450	.82011	.082
	[M]	1.9989(*)	.83581	.019
	[R+NE]	.0207	.83581	.980
[R+NE]	[S]	1.4243	.78984	.075
	[M]	1.9783(*)	.80613	.016
	[R]	-.0207	.83581	.980

Note: mean= mean number of collocates produced

* The mean difference is significant at the .05 level.

4.2.2.2. Production of collocates for each target verb

Table 13 shows the total tokens/ types of collocates produced by all participants for each target verb. These statistics provide us with a general impression of the effect of complexity in acquiring collocational features. Generally speaking, more tokens of old and new target-like collocates were produced for *wield* and *warp* (simple rules) than for *make* and *take* (complex rules), and more tokens of non-target-like collocates were produced for *make* and *take* (complex rules) than for *wield* and *warp* (simple rules). A more detailed statistical analysis will be made in 4.2.3 -4.2.7.

Table 13 Production of collocates for each target verb

Target verbs	tokens/ types of collocates produced by all participants						Total
	Old collocates	New collocates					
		Target-like	Non-target-like	Semi(1)	Semi(2)	Total	
wield	138/6	44/15	67/39	23/7	33/6	167/67	305/73
warp	136/6	83/32	55/46	19/12	6/4	163/94	299/100
make	124/6	33/16	85/60	0/0	0/0	118/76	242/82
take	97/6	29/15	105/77	0/0	0/0	134/92	231/98
Total tokens	495	189	312	42	39	582	1077

Note: semi = semi-target-like collocates

4.2.3. Production of old collocates

According to Research Hypothesis 2, in terms of producing old collocates for the target verbs (i.e., collocates that appeared in the passages), the *memorization for recall*, *rule given* and *rule given plus negative evidence* groups will significantly outperform the *semantic processing* group, and this trend will be found among students of both proficiency levels and for all the target verbs. This prediction is partially confirmed.

Table 14 presents the descriptive statistics of the production of old collocates by complexity * level * attention.

Table 14 Descriptive statistics of old collocates by complexity * level * attention

Complexity	Level	Attention	Mean	Std. deviation	N
Simple	2	[S]	.7500	.96531	12
		[M]	2.5455	2.33939	11
		[R]	4.0000	3.02372	8
		[R+NE]	2.4000	1.77639	10
		Total	2.2683	2.29155	41
	4	[S]	1.2308	.83205	13
		[M]	4.0000	1.90693	12
		[R]	4.0833	1.62135	12
		[R+NE]	5.2308	1.96443	13
		Total	3.6200	2.19359	50
	Total	[S]	1.0000	.91287	25
		[M]	3.3043	2.20402	23
		[R]	4.0500	2.21181	20
		[R+NE]	4.0000	2.33550	23
		Total	3.0110	2.32615	91
Complex	2	[S]	1.0000	1.41421	12
		[M]	2.4545	2.25227	11
		[R]	3.6250	3.77728	8
		[R+NE]	1.8000	1.93218	10
		Total	2.0976	2.45769	41
	4	[S]	.3846	.65044	13
		[M]	3.3333	1.87487	12
		[R]	3.0000	1.85864	12
		[R+NE]	4.1538	2.23033	13
		Total	2.7000	2.23379	50
	Total	[S]	.6800	1.10755	25
		[M]	2.9130	2.06514	23
		[R]	3.2500	2.71206	20
		[R+NE]	3.1304	2.37992	23
		Total	2.4286	2.34352	91

Note: mean= mean number of old collocates produced

N= number of participants.

An ANOVA of the number of old collocates was performed, with level and attention as between-subjects factors and complexity as a within-subjects factor. The statistical test showed five major results:

(1) Proficiency level had a significant main effect ($F(1,83)=5.243$, $p=.025$, $\eta_p^2=.059$), with learners of Level 4 producing significantly more number of old collocates than learners of Level 2;

(2) Collocational complexity had a significant main effect ($F(1, 83)=10.208$, $p=.002$, $\eta_p^2 = .110$), with learners producing significantly more number of old collocates for *wield* and *warp* (simple rules) than for *make* and *take* (complex rules). As previously shown in Table 13, the total number of old collocates produced for *wield*, *warp*, *make* and *take* were 138, 136, 124 and 97 respectively. Table 15 shows what old collocates were produced for each target verb and how many participants produced them.

Table 15 Production of old collocates for each target verb

Target verbs	**Old collocate (number of participants who produced that collocate)**					
wield	*power* (44)	*stick*(27)	*knife* (24)	*weapon* (21)	*control* (15)	*influence* (7)
warp	*floor* (45)	*mind*(32)	*bookshelf* (27)	*door* (19)	*view* (7)	*judgment* (6)
make	*speech* (47)	*change*(24)	*suggestion* (22)	*progress* (13)	*recovery* (9)	*claim* (9)
take	*power* (23)	*step* (22)	*look* (16)	*role* (15)	*breath* (11)	*lead* (10)

(3) Attention had a significant main effect ($F(3, 83)= 12.769$, $p= .000$, $\eta_p^2 = .316$);

To locate the difference among the four attentional conditions, a post-hoc Scheffé test was performed, which revealed a significant difference between *semantic processing* and each of the other three conditions (i.e., *memory for recall, rule given* and *rule given plus negative evidence*), with the *semantic processing* group producing significantly fewer old collocates than the other groups (see Table 16). This is exactly what was predicted by Research Hypothesis 2.

Table 16 Post-hoc Scheffé test of the effect of attention on the production of old collocates

Attention	Attention	Mean difference	Std. Error	Sig.
[S]	[M]	-2.2687(*)	.50877	.000
	[R]	-2.8100(*)	.52827	.000
	[R+NE]	-2.7252(*)	.50877	.000
[M]	[S]	2.2687(*)	.50877	.000
	[R]	-.5413	.53838	.799
	[R+NE]	-.4565	.51926	.856
[R]	[S]	2.8100(*)	.52827	.000
	[M]	.5413	.53838	.799
	[R+NE]	.0848	.53838	.999
[R+NE]	[S]	2.7252(*)	.50877	.000
	[M]	.4565	.51926	.856
	[R]	-.0848	.53838	.999

Note: mean= mean number of old collocates produced;

* The mean difference is significant at the .05 level.

There was another interesting phenomenon. Although as shown in Table 15, all the target nouns in the reading passages were recalled by learners, some of the nouns, that is, (1) *mind* (collocate for *warp),* (2) *recovery, progress, claim* (collocates for *make*), (3) *lead, role* (collocates for *take*) were only written by learners from *memorization for recall*, *rule given* and *rule given plus negative evidence* groups; and none of the participants from the *semantic processing* group recalled these nouns.

(4) The interaction between attention and collocational complexity was not significant ($F (3, 83) = .578$, $p= .613$, $\eta_p^2 = .020$);

(5) The interaction between attention and proficiency level was significant ($F (3, 83) = 3.118$, $p=.030$, $\eta_p^2 = .101$) (See Figures 2 and 3);

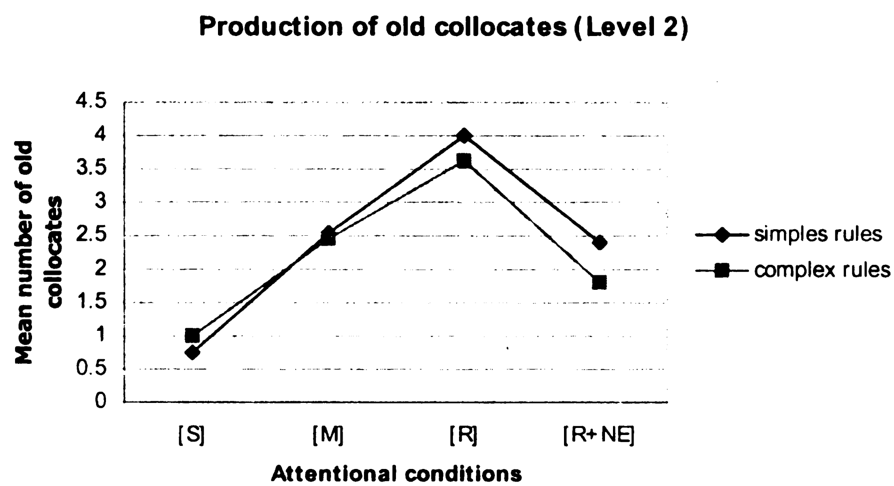

Figure 2. Production of old collocates (Level 2)

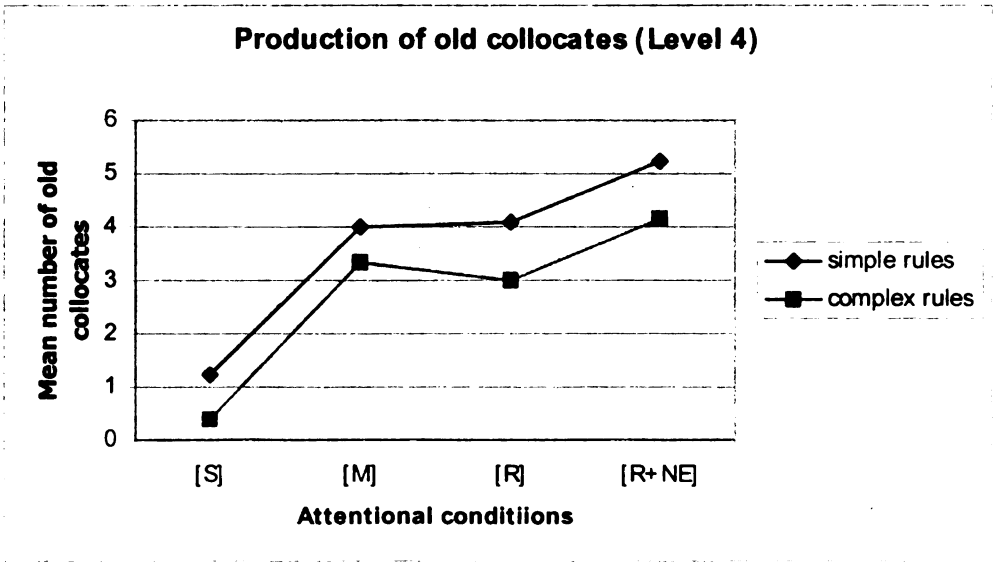

Figure 3. Production of old collocates (Level 4)

Since the effect of attention was mediated by level, separate ANOVAs were conducted for the results of Level 2 and Level 4, with attention as a between-subjects factor and complexity as a within-subjects factor.

For Level 2 students, it was found that (1) attention had a main effect ($F(3, 37) = 3.271$, $p= .032$, $\eta_p^2 = .210$), (2) complexity did not have a main effect ($F(1, 37) =.777$, $p=.384$, $\eta_p^2 = .021$), (3) attention and complexity did not have significant interaction ($F(3, 37) = .679$, $p=.571$, $\eta_p^2 = .052$). A post-hoc Scheffé test of attention demonstrated significant difference between *rule given* and *semantic processing* conditions, with the former group significantly outperforming the latter; but there was no significant difference between *memorization for recall* and *semantic processing*, or between *rule given plus negative evidence* and *semantic processing* (see Table 17). Moreover, as shown in Figures 2 and 3, the increasing trend from *rule given* to *rule given plus negative evidence* group, which was found with Level 4, did not hold for Level 2. Instead, for Level 2, the *rule given plus negative evidence* group produced fewer old collocates than the *rule given* group and even the *memorization for recall* group.

Table 17 Post-hoc Scheffé test of the effect of attention on production of old collocates (Level 2)

Attention	Attention	Mean difference	Std. error	Sig.
[S]	[M]	-1.6250	.87326	.340
	[R]	-2.9375(*)	.95487	.036
	[R+NE]	-1.2250	.89575	.604
[M]	[S]	1.6250	.87326	.340
	[R]	-1.3125	.97208	.614
	[R+NE]	.4000	.91407	.979
[R]	[S]	2.9375(*)	.95487	.036
	[M]	1.3125	.97208	.614
	[R+NE]	1.7125	.99233	.407
[R+NE]	[S]	1.2250	.89575	.604
	[M]	-.4000	.91407	.979
	[R]	-1.7125	.99233	.407

Note: mean = mean number of old collocates

* The mean difference is significant at the .05 level.

For Level 4 students, it was found that (1) attention had a significant main effect ($F(3, 46) = 17.237$, $p=.000$, $\eta_p^2 = .529$); (2) complexity also had a main effect ($F(1, 46) = 13.066$, $p= .001$, $\eta_p^2 = .221$); (3) the effect of attention was not mediated by complexity ($F(3, 46) = .153$, $p=.927$, $\eta_p^2 = .010$). A post-hoc Scheffé test of attention showed a pattern that was consistent with the overall result, that is, the *semantic processing* group produced significantly fewer old collocates than each of the other three conditions (see Table 18).

Table 18 Post-hoc Scheffé test of the effect of attention on production of old collocates (Level 4)

Attention	Attention	Mean difference	Std. error	Sig.
[S]	[M]	-2.8590(*)	.57661	.000
	[R]	-2.7340(*)	.57661	.000
	[R+NE]	-3.8846(*)	.56496	.000
[M]	[S]	2.8590(*)	.57661	.000
	[R]	.1250	.58803	.997
	[R+NE]	-1.0256	.57661	.378
[R]	[S]	2.7340(*)	.57661	.000
	[M]	-.1250	.58803	.997
	[R+NE]	-1.1506	.57661	.277
[R+NE]	[S]	3.8846(*)	.56496	.000
	[M]	1.0256	.57661	.378
	[R]	1.1506	.57661	.277

Note: mean = mean number of old collocates;

* The mean difference is significant at the .05 level.

In short, the effect of attention on the production of old collocates was mediated by the factor of proficiency level, with Level 2 learners behaving differently from the overall pattern. This interaction relationship was not predicted by Hypothesis 2.

4.2.4. Production of new collocates – overall comparison

Table 19 and Figure 4 present the statistics for the production of new collocates.

Table 19 Descriptive statistics of new collocates by complexity * level * attention

Complexity	Level	Attention	Mean	Std. deviation	N
Simple	2	[S]	5.1667	4.58918	12
		[M]	2.0000	2.32379	11
		[R]	3.5000	1.92725	8
		[R+NE]	2.6000	1.50555	10
	4	[S]	4.0769	4.88981	13
		[M]	1.6667	2.26969	12
		[R]	4.6667	3.05505	12
		[R+NE]	4.8462	1.67562	13
Complex	2	[S]	4.8333	3.48590	12
		[M]	1.7273	2.24013	11
		[R]	2.7500	2.25198	8
		[R+NE]	2.6000	1.64655	10
	4	[S]	4.1538	4.07934	13
		[M]	1.5000	2.19504	12
		[R]	1.7500	2.17945	12
		[R+NE]	2.6154	1.75777	13

Note: mean = mean number of new collocates

N= number of participants

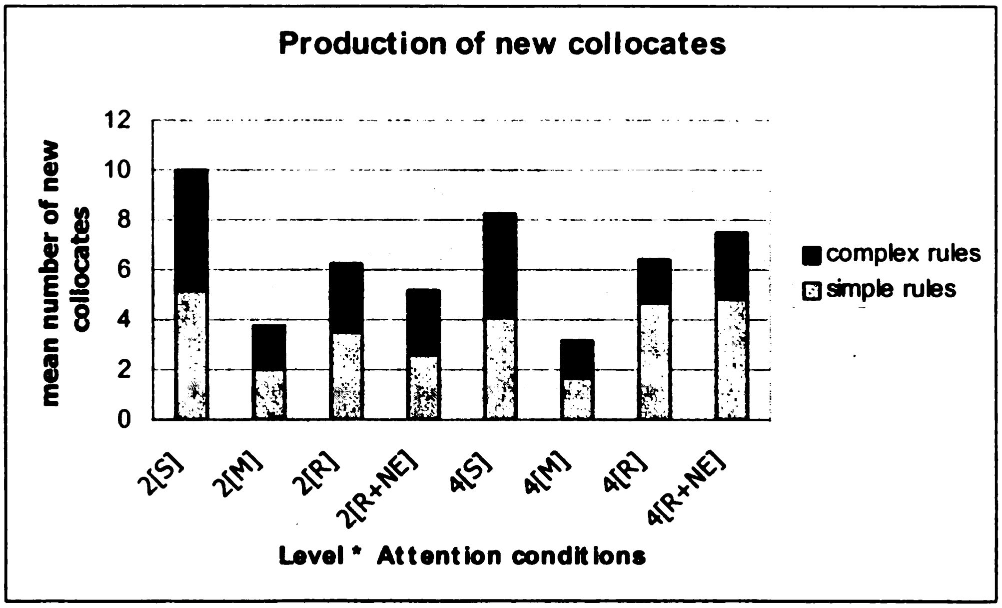

Figure 4 Production of new collocates

An ANOVA of the number of new collocates was performed, with level and attention as between-subjects factors and complexity as a within-subjects factor. There were three major findings:

(1) Proficiency level did not have a significant main effect ($F(1, 83) = .000$, $p = .983$, $\eta_p^2 = .000$).

(2) Collocational complexity had a significant main effect ($F(1, 83) = 16.926$, $p = .000$, $\eta_p^2 = .169$), with the mean number of new collocates for *wield* and *warp* (simple rules) being significantly more than that of *make* and *take* (complex rules). As previously shown in Table 13, the total number of new collocates produced for *wield, warp, make* and *take were* 167, 163, 118 and 134 respectively.

3) Attention had a significant main effect ($F(3, 83) = 4.254$, $p = .008$, $\eta_p^2 = .133$).

As shown in Table 19 and Figure 4, overall, the *semantic processing* group produced more new collocates than the other three groups; the *memorization for recall* group wrote the fewest new collocates. A post-hoc Scheffé test of attention showed that a significant difference lay between *memorization for recall* and *semantic processing*, with the *memorization for recall* group producing significantly fewer extensions than the *semantic processing* group (see Table 20).

Table 20 Post-hoc Scheffé test of the effect of attention on production of new collocates

Attention	Attention	Mean difference	Std. error	Sig.
[S]	[M]	5.6452(*)	1.58550	.008
	[R]	2.7300	1.64627	.437
	[R+NE]	2.6017	1.58550	.446
[M]	[S]	-5.6452(*)	1.58550	.008
	[R]	-2.9152	1.67778	.394
	[R+NE]	-3.0435	1.61819	.323
[R]	[S]	-2.7300	1.64627	.437
	[M]	2.9152	1.67778	.394
	[R+NE]	-.1283	1.67778	1.000
[R+NE]	[S]	-2.6017	1.58550	.446
	[M]	3.0435	1.61819	.323
	[R]	.1283	1.67778	1.000

Note: mean = mean number of new collocates

* The mean difference is significant at the .05 level.

Before ending this section and turning to the result of each sub-type of new collocates, we will look at the ratio of old to new collocates in each level * attention group: 2[S] = .175, 2[M] = 1.341, 2[R] = 1.22, 2[R+NE] = .808, 4[S] = .196, 4[M] = 2.316, 4[R] = 1.104, 4[R+NE] = 1.237 (See Figure 5). As shown by the numbers, for both *rule given* and *rule given plus negative evidence* groups, they produced similar number of old and new collocates. For *memorization for recall* group, old collocates tended to occupy a much larger percentage than new collocates. In contrast, for the *semantic processing* group, old collocates took up a very small percentage and new collocates dominated their production.

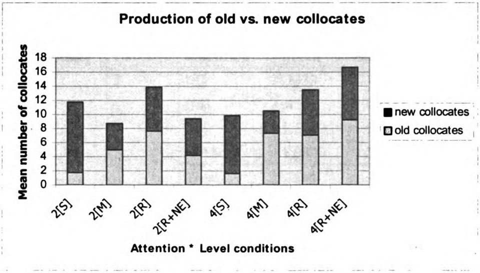

Figure 5 Production of old vs. new collocates

4.2.5. Production of new target-like collocates

Now we will turn to the first sub-type of new collocates produced by participants, that is, new target-like collocates (collocates that follow the target rules but which did not appear in the passages). Research Hypothesis 3 states that, in general, the *rule given* and *rule given plus negative evidence* groups will write significantly more new target-like collocates than the *memorization for recall* and *semantic processing* groups, but for lower-level students learning complex collocational patterns (i.e., those of *make* and *take*), there might be no significant difference between the two rule-oriented and the two non-rule-oriented groups. As will be shown below, this hypothesis is partially confirmed. Table 21 presents the descriptive statistics of the production of new target-like collocates by complexity *level * attention.

Table 21 Descriptive statistics of new target-like collocates by complexity * level * attention

Complexity	Level	Attention	Mean	Std. Deviation	N
simple	2	[S]	.3333	.77850	12
		[M]	.4545	1.03573	11
		[R]	1.5000	1.51186	8
		[R+NE]	1.0000	1.33333	10
		Total	.7561	1.19959	41
	4	[S]	.8462	.98710	13
		[M]	.8333	1.46680	12
		[R]	2.9167	2.39159	12
		[R+NE]	3.0769	1.44115	13
		Total	1.9200	1.92555	50
	Total	[S]	.6000	.91287	25
		[M]	.6522	1.26522	23
		[R]	2.3500	2.15883	20
		[R+NE]	2.1739	1.72290	23
		Total	1.3956	1.73128	91
complex	2	[S]	.2500	.62158	12
		[M]	.0909	.30151	11
		[R]	1.2500	1.83225	8
		[R+NE]	.7000	.94868	10
		Total	.5122	1.05171	41
	4	[S]	.0769	.27735	13
		[M]	.0833	.28868	12
		[R]	.7500	1.21543	12
		[R+NE]	2.3077	1.70219	13
		Total	.8200	1.39518	50
	Total	[S]	.1600	.47258	25
		[M]	.0870	.28810	23
		[R]	.9500	1.46808	20
		[R+NE]	1.6087	1.61637	23
		Total	.6813	1.25503	91

Note: mean = mean number of new target-like collocates

N= number of participants.

An ANOVA of production of new target-like collocates was performed, with level and attention as between-subjects factors and complexity as a within-subjects factor. There were five major findings:

(1) The effect of level was significant ($F(1, 83) = 8.969$, $p = .004$, $\eta_p^2 = .098$), with Level 4 learners producing significantly more new target-like collocates than Level 2 learners;

(2) The effect of complexity was significant ($F(1, 83) = 21.213$, $p = .000$, $\eta_p^2 = .204$), with learners producing significantly more new target-like collocates for *wield* and *warp* (easy rules) than for *make* and *take* (complex rules). As previously shown in Table 13, the total number of new target-like collocates produced for *wield* (44) and *warp* (83) were both more than those for *make* (33) and *take* (29).

(3) The effect of attention was significant ($F(3, 83) = 12.012$, $p = .000$, $\eta_p^2 = .303$);

A post-hoc Scheffé test of attention showed that the two rule-oriented groups (i.e., *rule given* and *rule given plus negative evidence* groups) produced significantly more new target-like collocates than the two non-rule-oriented groups (i.e., *semantic processing* and *memorization for recall* groups) (see Table 22). This pattern is the same as the prediction made in Hypothesis 3.

Table 22 Post-hoc Scheffé test of the effect of attention on production of new target-like collocates

Attention	Attention	Mean difference	Std. error	Sig.
[S]	[M]	.0104	.30204	1.000
	[R]	-1.2700(*)	.31362	.002
	[R+NE]	-1.5113(*)	.30204	.000
[M]	[S]	-.0104	.30204	1.000
	[R]	-1.2804(*)	.31962	.002
	[R+NE]	-1.5217(*)	.30827	.000
[R]	[S]	1.2700(*)	.31362	.002
	[M]	1.2804(*)	.31962	.002
	[R+NE]	-.2413	.31962	.903
[R+NE]	[S]	1.5113(*)	.30204	.000
	[M]	1.5217(*)	.30827	.000
	[R]	.2413	.31962	.903

Note: mean = mean number of new target-like collocates

* The mean difference is significant at the .05 level.

(4) The interaction between attention and complexity was not significant ($F(3, 83) = 1.324$, $p=.272$, $\eta_p^2 = .046$).

(5) The interaction between attention and level was significant ($F(3, 83) = 3.321$, $p=.024$, $\eta_p^2 = .107$) (see Figures 6 and 7).

Separate ANOVA tests of the number of new target-like collocates were conducted for Level 2 and Level 4, with attention as a between-subjects factor and complexity as a within-subjects factor.

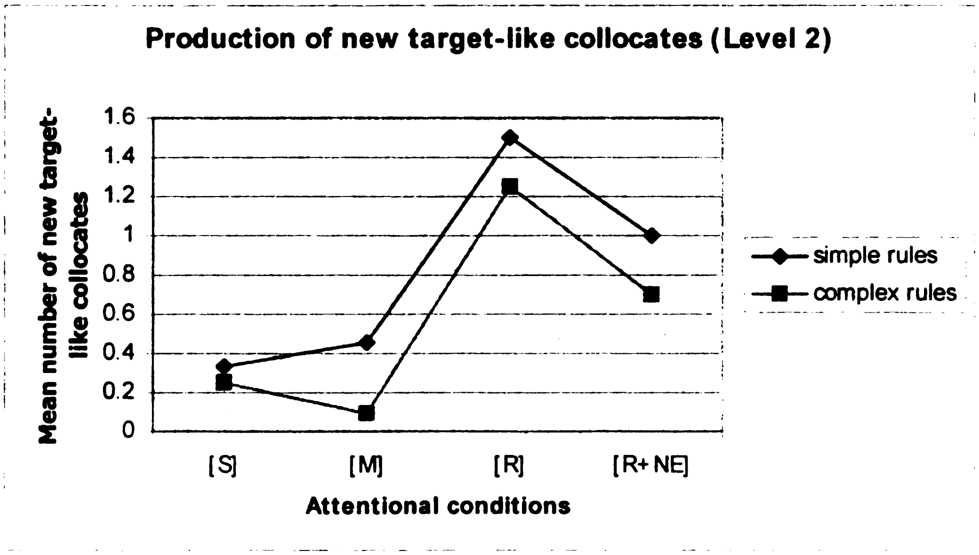

Figure 6. Production of new target-like collocates (Level 2)

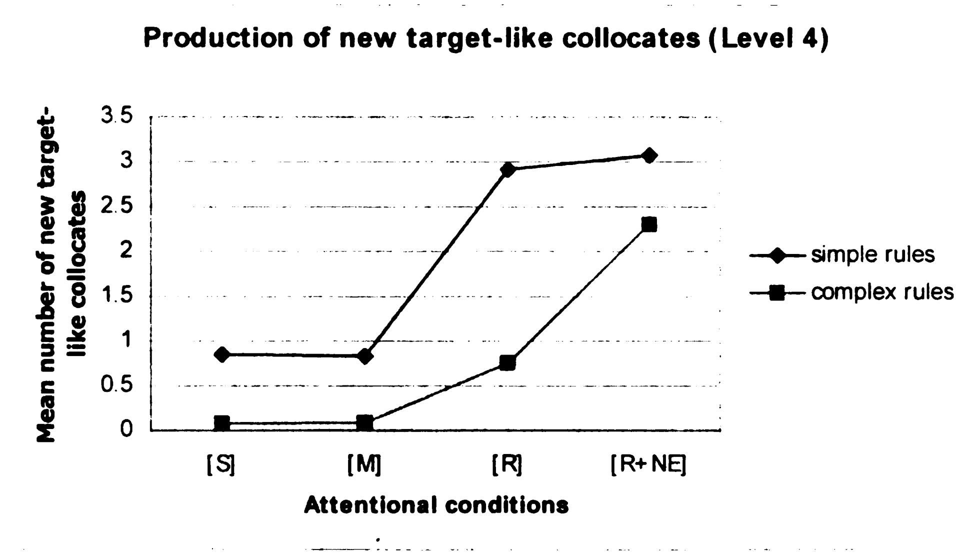

Figure 7. Production of new target-like collocates (Level 4)

For Level 2 students, it was found (1) the effect of attention was significant ($F(3, 37) = 3.186$, $p=.035$, $\eta_p^2 = .205$), (2) the effect of complexity was not significant ($F(1, 37) = 1.7367$, $p=.196$, $\eta_p^2 = .045$), (3) the effect of attention was not mediated by complexity

($F(3, 37) = .116$, $p= .950$, $\eta_p^2 = .009$). A post-hoc LSD test found that the *rule given* group significantly outperformed the two non-rule-oriented groups, but the *rule given plus negative evidence* group did not have any significant superiority over the two non-rule-oriented groups (see Table 23). In fact, as shown in Figures 6 and 7, the increasing trend from *rule given* to *rule given plus negative evidence*, which was found with Level 4, did not hold for Level 2.

Table 23 Post-hoc LSD test of the effect of attention on production of new target-like collocates (Level 2)

Attention	Attention	Mean difference	Std. Error	Sig.
[S]	[M]	.0189	.37468	.960
	[R]	-1.0833(*)	.40970	.012
	[R+NE]	-.5583	.38433	.155
[M]	[S]	-.0189	.37468	.960
	[R]	-1.1023(*)	.41708	.012
	[R+NE]	-.5773	.39219	.150
[R]	[S]	1.0833(*)	.40970	.012
	[M]	1.1023(*)	.41708	.012
	[R+NE]	.5250	.42577	.225
[R+NE]	[S]	.5583	.38433	.155
	[M]	.5773	.39219	.150
	[R]	-.5250	.42577	.225

Note: mean = mean number of new target-like collocates

* The mean difference is significant at the .05 level.

For Level 4 students, attention had a significant main effect ($F(3, 46) =11.585$, $p=.000$, $\eta_p^2 = .430$), and so did complexity ($F(1, 46) =26.247$, $p=.000$, $\eta_p^2 = .363$). The interaction between attention and complexity approached significance ($F(3, 46) =2.538$, p=.068, $\eta_p^2 = .142$). A post-hoc Scheffé test of attention revealed a result consistent with the overall pattern, that is, the two rule-oriented groups (*rule given, rule given plus negative evidence*) produced significantly more new target-like collocates than the two non-rule-oriented groups (*semantic processing, memorization for recall*) (See Table 24).

Table 24 Post-hoc Scheffé test of the effect of attention on production of new-target-like collocates (Level 4)

Attention	Attention	Mean difference	Std. error	Sig.
[S]	[M]	.0032	.46060	1.000
	[R]	-1.3718(*)	.46060	.042
	[R+NE]	-2.2308(*)	.45129	.000
[M]	[S]	-.0032	.46060	1.000
	[R]	-1.3750(*)	.46972	.047
	[R+NE]	-2.2340(*)	.46060	.000
[R]	[S]	1.3718(*)	.46060	.042
	[M]	1.3750(*)	.46972	.047
	[R+NE]	-.8590	.46060	.336
[R+NE]	[S]	2.2308(*)	.45129	.000
	[M]	2.2340(*)	.46060	.000
	[R]	.8590	.46060	.336

Note: mean = mean number of new target-like collocates

* The mean difference is significant at the .05 level.

In short, in terms of the overall effect of attention on production of new target-like collocates, the result is consistent with the prediction in Research Hypothesis 3, that is, the rule-oriented groups outperformed the non-rule-oriented groups. However, when it came to the interaction between attention and level/complexity, the hypothesis was not confirmed. According to the hypothesis, attention would not show a main effect for Level

2 learners learning complex collocational rules. But in reality, the *rule given plus negative evidence* group of Level 2 lost its advantage over the two non-rule-oriented groups with both simple and complex rules, while the *rule given* group kept its significant advantage with both types of rules.

4.2.6. Production of non-target-like collocates

The second sub-type of new collocates produced by participants is non-target-like collocates (i.e., collocates that do not follow the target rules). According to Research Hypothesis 4, in general, the *rule given plus negative evidence* group will write significantly fewer number of non-target-like collocates than the *rule given* group, which in turn will write fewer number of non-target-like collocates than the *memorization for recall* and *semantic processing* groups, but the significant difference among the four attentional conditions might not hold for lower-level students learning complex collocational patterns (i.e., those of *make* and *take*). The result is not completely the same as this hypothesis. Table 25 presents the descriptive statistics of production of non-target-like collocates by complexity * level * attention.

Table 25 Descriptive statistics of non-target-like collocates by complexity * level * attention

Complexity	Level	Attention	Mean	Std. deviation	N
Simple	2	[S]	3.6667	3.84550	12
		[M]	.9091	1.04447	11
		[R]	1.1250	1.55265	8
		[R+NE]	.6000	.84327	10
		Total	1.6829	2.57332	41
	4	[S]	2.6154	4.15408	13
		[M]	.8333	1.52753	12
		[R]	.1667	.38925	12
		[R+NE]	.5385	.77625	13
		Total	1.0600	2.41939	50
	Total	[S]	3.1200	3.96148	25
		[M]	.8696	1.28997	23
		[R]	.5500	1.09904	20
		[R+NE]	.5652	.78775	23
		Total	1.3407	2.49542	91
Complex	2	[S]	4.5833	3.67939	12
		[M]	1.6364	2.06265	11
		[R]	1.5000	2.44949	8
		[R+NE]	1.9000	1.72884	10
		Total	2.5366	2.88182	41
	4	[S]	4.0769	3.98877	13
		[M]	1.4167	2.23437	12
		[R]	1.0000	1.95402	12
		[R+NE]	.3077	.63043	13
		Total	1.7200	2.85028	50
	Total	[S]	4.3200	3.77183	25
		[M]	1.5217	2.10777	23
		[R]	1.2000	2.11760	20
		[R+NE]	1.0000	1.44600	23
		Total	2.0879	2.87769	91

Note: mean= mean number of non-target-like collocates

N= number of participants.

An ANOVA of the number of non-target-like collocates was performed, with attention and level as between-subjects factors and complexity as a within-subjects factor. There were five major findings:

(1) The effect of proficiency level was not significant ($F(1, 83) = 1.671$, $p= .200$, $\eta_p^2 = .020$).

(2) The effect of collocational complexity was significant ($F(1, 83) = 14.598$, $p=.000$, $\eta_p^2 = .150$), with the non-target-like collocates for *make* and *take* (complex rules) being significantly more than those for *wield* and *warp* (simple rules). As previously shown in Table 13, the number of non-target-like collocates for *make* (85) and *take* (105) were both more than those for *wield* (67) and *warp* (55).

(3) The effect of attention was significant ($F(3, 83) = 8.883$, $p= .000$, $\eta_p^2 = .243$);

A post-hoc Scheffé test of attention showed that significant difference lay between *semantic processing* and all the other three groups (i.e., *memorization for recall, rule given*, and *rule given plus negative evidence*). The three groups which included some degree of focal attention to the target collocations produced significantly fewer non-target-like collocates than the *semantic processing* group (see Table 26).

Table 26 Post-hoc Scheffé test of the effect of attention on production of non-target-like collocates

Attention	Attention	Mean difference	Std. error	Sig.
[S]	[M]	2.5243(*)	.65413	.003
	[R]	2.8450(*)	.67920	.001
	[R+NE]	2.9374(*)	.65413	.000
[M]	[S]	-2.5243(*)	.65413	.003
	[R]	.3207	.69220	.975
	[R+NE]	.4130	.66762	.943
[R]	[S]	-2.8450(*)	.67920	.001
	[M]	-.3207	.69220	.975
	[R+NE]	.0924	.69220	.999
[R+NE]	[S]	-2.9374(*)	.65413	.000
	[M]	-.4130	.66762	.943
	[R]	-.0924	.69220	.999

Note: mean = mean number of non-target-like collocates

* The mean difference is significant at the .05 level.

(4) The interaction between attention and complexity was not significant ($F(3, 83) = .636$, $p = .594$, $\eta_p^2 = .022$);

(5) The interaction between attention and level was not significant ($F(3, 83) = .113$, $p = .952$, $\eta_p^2 = .004$) (see Figures 8 and 9).

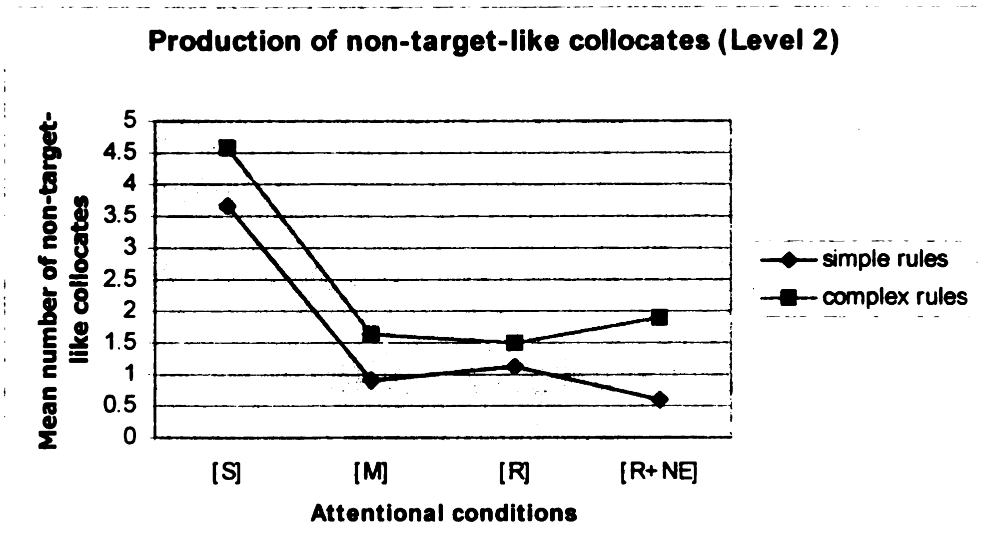

Figure 8 Production of non-target-like collocates (Level 2)

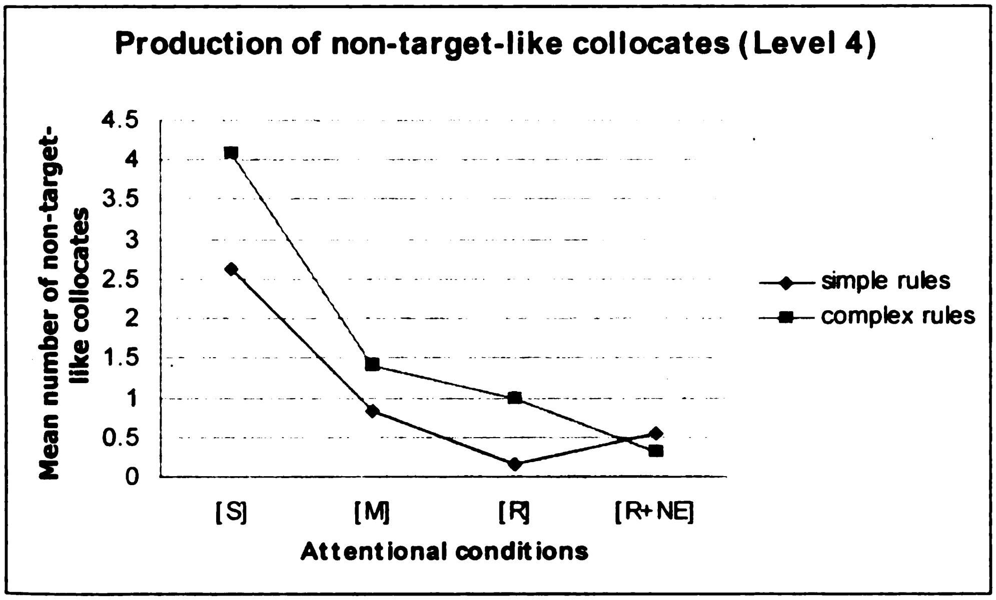

Figure 9 Production of non-target-like collocates (Level 4)

To sum up, the results with production of non-target-like collocates were different from Research Hypothesis 4. The hypothesis predicted that (1) the *rule given plus negative evidence* group would produce significantly fewer non-target-like collocates than the *rule given* group, which in turn would produce significantly fewer non-target-like collocates than the *memorization for recall* and *semantic processing* groups; (2) the effect of attention would be mediated by level and complexity. However, it turned out that (1) although the trend predicted by the hypothesis was observed (i.e., the number of non-target-like collocates increased with the order of [R+NE], [R], [M] and [S]), there was no statistically significant difference among the *rule given plus negative evidence, rule given* and *memorization for recall* groups, and they all significantly outperformed the *semantic processing* group; (2) the effect of attention was independent from that of complexity and proficiency level.

4.2.7. Production of semi-target-like collocates

The last type of new collocates produced by participants is semi-target-like collocates.

Table 27 presents the descriptive statistics of production of semi-target-like collocates (1) by level * attention, that is, nouns sharing partial semantic features with the target noun collocates. Because all the semi-target-like collocates (1) were for *wield* and *warp*, the factor of complexity was irrelevant here.

Table 27 Descriptive statistics of semi-target-like collocates (1)

Level	Attention	Mean	Std. Deviation	N
2	[S]	.5833	.79296	12
	[M]	.4545	.93420	11
	[R]	.5000	.75593	8
	[R+NE]	.5000	.52705	10
	Total	.5122	.74572	41
4	[S]	.3077	.63043	13
	[M]	.0000	.00000	12
	[R]	.8333	1.11464	12
	[R+NE]	.5385	.51887	13
	Total	.4200	.73095	50
Total	[S]	.4400	.71181	25
	[M]	.2174	.67126	23
	[R]	.7000	.97872	20
	[R+NE]	.5217	.51075	23
	Total	.4615	.73496	91

Note: mean = mean number of semi-target-like collocates (1)
N= number of participants.

An ANOVA was performed, with level and attention as two independent factors and the number of semi-target-like collocates (1) as a dependent factor. Neither attention nor level had a significant main effect (Attention: $F\ (3, 83) = 1.355$, $p = .262$, $\eta_p^2 = .047$; Level: $F\ (1, 83) = .338$, $p = .563$, $\eta_p^2 = .004$).

Table 28 presents the descriptive statistics of production of semi-target-like collocates (2) by level*attention, that is, nouns reflecting some general terms that semantically dominate the target-like nouns or are superordinates of the target-like nouns. Like the case with semi-target-like collocates (1), all the semi-target-like collocates (2) were for *wield* and *warp* only, so the factor of complexity was irrelevant here.

Table 28 Descriptive statistics of semi-target-like collocates (2)

Level	Attention	Mean	Std. Deviation	N
2	[S]	.5833	.66856	12
	[M]	.1818	.60302	11
	[R]	.3750	.74402	8
	[R+NE]	.5000	.70711	10
	Total	.4146	.66991	41
4	[S]	.3077	.63043	13
	[M]	.0000	.00000	12
	[R]	.7500	1.05529	12
	[R+NE]	.6923	.94733	13
	Total	.4400	.81215	50
Total	[S]	.4400	.65064	25
	[M]	.0870	.41703	23
	[R]	.6000	.94032	20
	[R+NE]	.6087	.83878	23
	Total	.4286	.74748	91

Note: mean = mean number of semi-target-like collocates (2)

N= number of participants.

An ANOVA was performed, with level and attention as two independent factors and the number of semi-target-like collocates (2) as a dependent factor. It was found that neither attention nor level had a significant main effect (Attention: F (3, 83) =2.223, p=.092, η_p^2 = .074; Level: F (1, 83) =.031, p=.86, η_p^2 = .000).

To sum up, for the production of both types of semi-target-like collocates, neither attention nor proficiency level had a significant main effect.

4.2.8. Summary of collocate production

Table 29 and Figure 10 provide an overview of the production of each sub-type of collocates by each level * attention group.

Table 29 Production of each sub-type of collocates by level * attention

Level* attention	Mean number of collocates produced					
	old	new target-like	non-target-like	semi-target-like (1)	semi-target -like (2)	Total
	1.75	0.5833	8.25	0.5833	0.5833	11.75
2[M]	5	0.5455	2.5455	0.4545	0.1818	8.7273
2[R]	7.625	2.75	2.625	0.5	0.375	13.875
2[R+NE]	4.2	1.7	2.5	0.5	0.5	9.4
4[S]	1.6154	0.9231	6.6923	0.3077	0.3077	9.8462
4[M]	7.3333	0.9167	2.25	0	0	10.5
4[R]	7.0833	3.6667	1.1667	0.8333	0.75	13.5
4[R+NE]	9.3846	5.3846	0.8462	0.5385	0.6923	16.8462

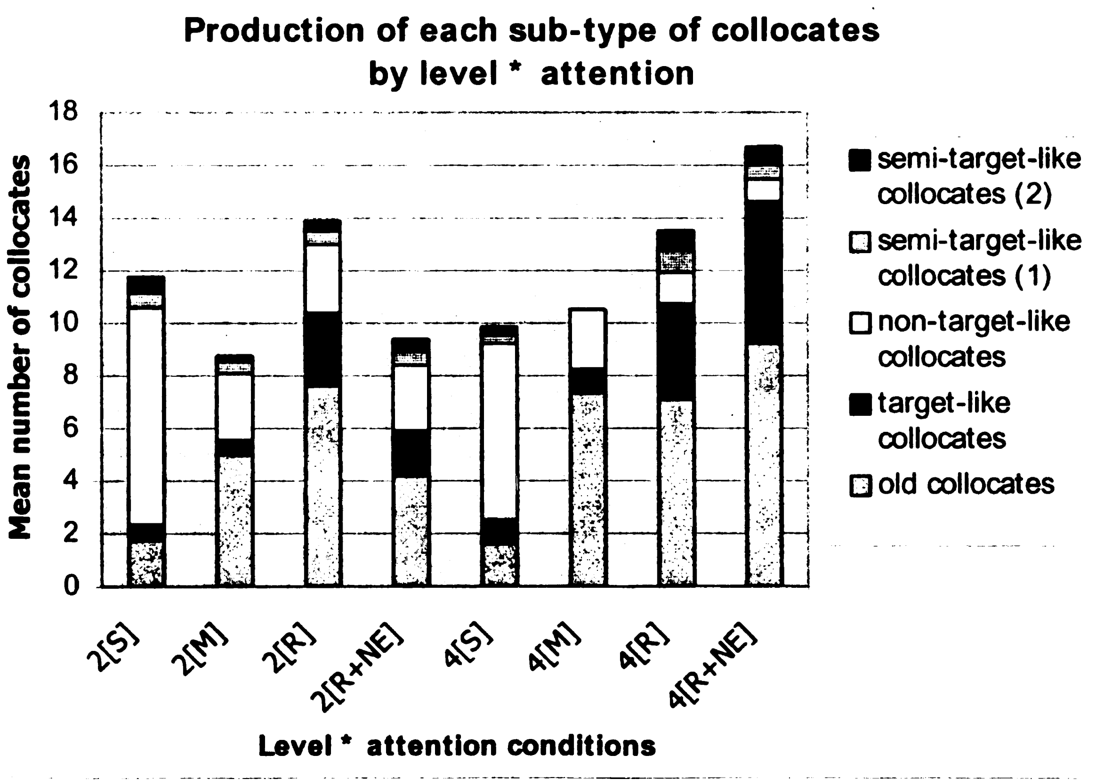

Figure 10 Production of each sub-type of collocates by level * attention

4.2.9. NS judgment of IL production

As described in Chapter 3, all the new collocates produced by participants were presented to two NSs of English, who categorized the IL production as Y (good combinations), O (OK, but not the best way to say it) or N (bad combinations). The interrater reliability was 87.54% (288 out of 329 TYPES (not tokens) of collocates). Not surprisingly, in most of the cases which caused different judgments (35 out of 41 cases), one NS judged the combination as O, while the other judged it as Y/N. Only 6 cases were judged as Y by one NS, while N by another. For those controversial cases, a third NS was consulted and the majority opinion was adopted. If the answers by the three NSs turned out to be Y, N, O, then that particular item was labeled as O. Tables 30 to 33 show the NS judgment of new target-like collocates, non-target-like collocates, semi-target-like collocates (1) and semi-target-like collocates (2) respectively.

Table 30 NS Judgment of new target-like collocates

	Y(= good combinations)	O (= OK, but not the best way to say it)	N (= bad combinations)
collocates of *wield*	9	4	2
collocates of *warp*	15	15	2
collocates of *make*	7	7	2
collocates of *take*	4	8	3

Note: The number in the table indicates how many types (not tokens) of a verb's new target-like collocates are judged as Y, O or N.

Table 31 NS Judgment of non-target-like collocates

	Y(= good combinations)	O (= OK, but not the best way to say it)	N (= bad combinations)
collocates of *wield*	0	4	35
collocates of *warp*	0	4	42
collocates of *make*	22	18	20
collocates of *take*	41	3	33

Note: The number in the table indicates how many types (not tokens) of a verb's non-target-like collocates are judged as Y, O or N.

Table 32 NS Judgment of semi-target-like collocates (1)

	Number of collocates for each category		
	Y(= good combinations)	O (= OK, but not the best way to say it)	N (= bad combinations)
collocates of *wield*	1	1	5
collocates of *warp*	0	2	10

Note: The number in the table indicates how many types (not tokens) of a verb's semi-target-like collocates (1) are judged as Y, O or N.

Table 33 NS Judgment of semi-target-like collocates (2)

	Number of collocates for each category		
	Y(= good combinations)	O (= OK, but not the best way to say it)	N (= bad combinations)
collocates of *wield*	3	3	0
collocates of *warp*	1	3	0

Note: The number in the table indicates how many types (not tokens) of a verb's semi-target-like collocates (2) are judged as Y, O or N.

There are three important pieces of information conveyed by Tables 30 - 33:

First, most target-like collocates were judged as good or OK by NSs (*wield*: 86.67%, *warp*: 93.75%, *make*: 87.5%, *take*: 80%).

Second, among the non-target-like collocates, the situation was somewhat different for *wield*, *warp* on the one hand and *make*, *take* on the other hand. For *wield* and *warp*, most non-target-like collocates were judged as bad (*wield*: 89.74%; *warp*: 91.30%) and there was no non-target-like collocates judged as good. However, for *make* and *take*, there were much more non-target-like collocates judged as good or OK (*make*: 66.67%; *take*: 57.14%).

Third, most semi-target-like collocates (1), that is, nouns sharing partial semantic features with the target nouns, were judged as bad (*wield*: 71.43%; *warp*: 83.33%); however, all the semi-target-like collocates (2), that is, superordinates of the target nouns, were judged as good or OK.

4.3. Judgment of collocations of the target verbs

4.3.1. Judgment of good collocations

According to Research Hypothesis 5, in terms of judging good collocations, attention to target collocational features does not have a main effect. This hypothesis makes the right prediction. Table 34 presents the descriptive statistics of the judgment of good collocations by complexity * level * attention. Figures 11 and 12 show the results for Level 2 and Level 4 respectively.

Table 34 Descriptive statistics of the judgment of good collocations by complexity * level * attention

Complexity	Level	Attention	Mean	Std. deviation	N
Simple	2	[S]	3.3846	.86972	13
		[M]	3.4167	.66856	12
		[R]	3.4444	.52705	9
		[R+NE]	3.0000	.66667	10
		Total	3.3182	.70785	44
	4	[S]	3.6923	.63043	13
		[M]	3.9167	.28868	12
		[R]	3.6667	.49237	12
		[R+NE]	3.9231	.27735	13
		Total	3.8000	.45175	50
	Total	[S]	3.5385	.76057	26
		[M]	3.6667	.56466	24
		[R]	3.5714	.50709	21
		[R+NE]	3.5217	.66535	23
		Total	3.5745	.63057	94
Complex	2	[S]	2.9231	1.03775	13
		[M]	3.4167	.66856	12
		[R]	3.0000	.70711	9
		[R+NE]	3.4000	.69921	10
		Total	3.1818	.81477	44
	4	[S]	3.1538	.80064	13
		[M]	3.2500	.75378	12
		[R]	3.5000	.79772	12
		[R+NE]	3.8462	.37553	13
		Total	3.4400	.73290	50
	Total	[S]	3.0385	.91568	26
		[M]	3.3333	.70196	24
		[R]	3.2857	.78376	21
		[R+NE]	3.6522	.57277	23
		Total	3.3191	.77893	94

Note: mean = mean score of judgment of good collocations;

The maximum score for judging good collocations of easy and complex patterns were both 4;

N = number of participants.

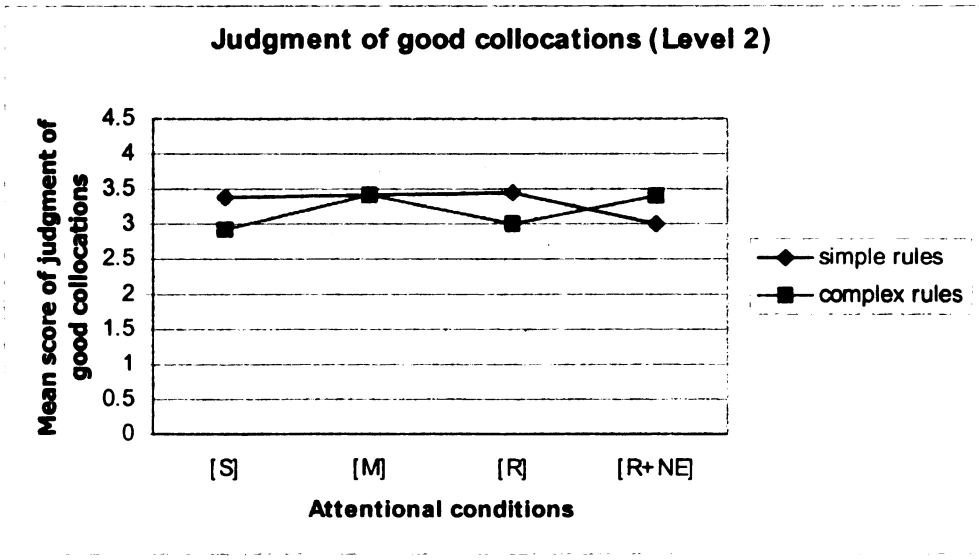

Figure 11 Judgment of good collocations (Level 2)

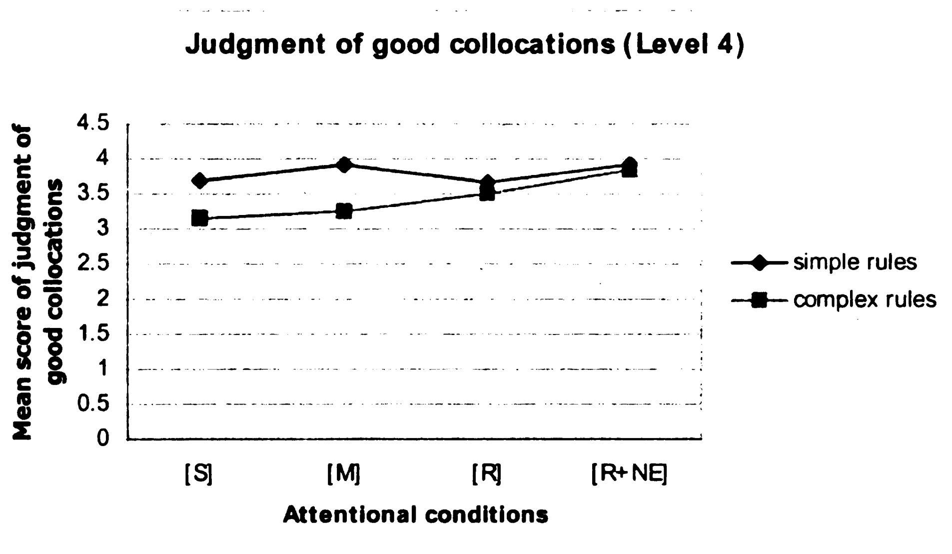

Figure 12 Judgment of good collocations (Level 4)

An ANOVA of the judgment of good collocations was performed, with attention and level as between-subjects factors, complexity as a within-subjects factor. It was found:

(1) Proficiency level had its significant main effect ($F(1, 86) = 11.563$, $p = .001$, $\eta_p^2 = .119$), with Level 4 outperforming Level 2.

(2) Collocational complexity had its significant main effect ($F(1, 86) = 7.618$, $p=.007$, $\eta_p^2 = .081$), with the mean score for *wield* and *warp* (simple rules) being significantly higher than the mean score for *make* and *take* (complex rules). Table 35 displays the number of participants who incorrectly judged a good sentence. As shown in the table, there were more participants who made errors with the good sentences including *make* and *take* than those who made errors with the good sentences including *wield* and *warp*. And learners seemed to perform the worst with the two sentences containing *take*.

Table 35 Number of participants who incorrectly judged a good sentence

Level*attention	***wield 1***	***wield 2***	***warp 1***	***warp 2***	***make 1***	***make 2***	***take 1***	***take 2***
2[S]	2	1	3	2	3	5	3	3
2[M]	1	2	1	3	2	2	2	1
2[R]	1	2	0	2	2	3	2	2
2[R+NE]	3	1	3	3	0	1	4	1
4[S]	0	1	2	1	1	1	6	2
4[M]	0	1	0	0	1	1	7	0
4[R]	0	1	0	3	0	2	0	5
4[R+NE]	0	0	0	1	0	0	0	2
Total	7	9	9	15	9	15	24	16

Note: wield 1 = the first good sentence containing *wield* in the judgment test;

wield 2 = the second good sentence containing *wield* in the judgment test;
The same is true with *warp 1, warp 2, make 1, make 2, take 1, take 2;*
See Table 8 in Chapter 3 for the order of the good sentences used in the judgment test.

(3) Attention did not have its significant main effect ($F(3, 86) = 1.141$, $p = .337$, $\eta_p^2 = .038$). As previously shown in Table 34, the mean score in all attentional conditions approached 4, the maximum point. This result is consistent with Research Hypothesis 5.

4.3.2. Judgment of bad collocations

Among the sentences for judgment, there were 8 containing a bad collocation, 2 for each target verb. Learners' response to a bad sentence could be classified into 6 major types:

(1) judging it as good;

(2) judging it as bad, but for reasons unrelated to the target collocations. For example, one student from the *rule given plus negative evidence* condition (Level 2) thought *warp* could not be used in passive voice, so judged the following sentence as wrong:

* *The company's operations have been warped since the new manager came.*

(3) judging it as bad, simply pointing out that the target verb-noun combination was inappropriate, without discussing which collocational rules were violated. For instance, one student from the *rule given* condition (Level 2) wrote that the combination *made two books* in the following sentence seemed odd:

**The writer made two books last year.*

Some students only underlined the target collocations, signaling that this was the wrong part.

(4) judging it as bad, pointing out that the target verb-noun combination was inappropriate, but using an incorrect collocational rule as the standard for judgment. For example, some students mistakenly used the rules for *make* to judge the combination of *take*; One student from *memorization for recall* condition (Level 2) underlined the phrase *wielded several methods* in a bad sentence and said that *wield* should be followed by concrete objects. Obviously, the rule written by the student was inaccurate compared to the target rules: "nouns referring to a concrete tool or piece of equipment that can be carried and used or nouns associated with the concept of power".

(5) judging it as bad, pointing out that the target verb-noun combination was inappropriate, using ONE OF the two target rules (In the experiment design, there were two collocational rules for each target verb). For example, one student from *rule given plus negative evidence* condition (Level 2) judged the following sentence as bad:

* *He didn't take any reply from his girlfriend.*

and the reason was that *reply* was not a physical movement. This was only concerned with one of the target collocational rules of *take.*

(6) judging it as bad, pointing out that the target verb-noun combination was inappropriate, using BOTH OF the two target rules. For example, one student from *rule given plus negative evidence* condition (Level 4) judged the following sentence as bad:

**He didn't take any support from this family.*

Meanwhile, it was pointed out that *support* had nothing to do with a role or physical activities. In this case, the two target rules of *take* were both mentioned.

Among the six types of responses, obviously, the first and second were wrong, so they were assigned 0. The sixth type was perfect in that it identified the error and also provided complete and correct reasons, so it was assigned 1 point, the maximum score. As to learners who gave the third, fourth and fifth types of responses, they also saw the inappropriateness of the target combinations, although they did not provide a reason or provided a wrong or incomplete semantic reason. Since the major purpose of the judgment test was to see whether learners could recognize or feel the collocational problems, rather than whether they possessed accurate judgment criteria, the third to fifth types of responses were also assigned 1 point. If they were given partial points instead, the scoring method might have unfairly favored the two rule-oriented groups, who were provided with explicit rules for sentence judgment.

Now we will turn to the statistical results. Research Hypothesis 6 states that in terms of judging bad collocations, in general, the *rule given plus negative evidence* group will outperform the *rule given* group, which in turn will outperform the *memorization for recall* and *semantic processing* groups, but the significant difference among the four attentional conditions might not hold for lower-level students learning complex collocational patterns. As will be shown below, the predicted overall effect was found in the experiment, but the interaction relationship between attention and proficiency level/ complexity was not. Table 36 presents the descriptive statistics of the judgment of bad collocations by complexity* level * attention.

Table 36 Descriptive statistics of the judgment of bad collocations by complexity * level * attention

Complexity	Level	Attention	Mean	Std. deviation	N
Simple	2	[S]	.8462	.98710	13
		[M]	.4167	.79296	12
		[R]	1.4444	1.66667	9
		[R+NE]	2.8000	1.22927	10
		Total	1.2955	1.43995	44
	4	[S]	.3077	.48038	13
		[M]	.2500	.62158	12
		[R]	1.0833	.99620	12
		[R+NE]	3.2308	1.01274	13
		Total	1.2400	1.46469	50
	Total	[S]	.5769	.80861	26
		[M]	.3333	.70196	24
		[R]	1.2381	1.30018	21
		[R+NE]	3.0435	1.10693	23
		Total	1.2660	1.44561	94

Table 36 (cont'd)

Complexity	Level	Attention	Mean	Std. deviation	N
Complex	2	[S]	.5385	.51887	13
		[M]	1.0833	.79296	12
		[R]	1.7778	1.20185	9
		[R+NE]	2.9000	1.10050	10
(Complex)		Total	1.4773	1.24804	44
	4	[S]	.8462	.80064	13
		[M]	1.0833	.90034	12
		[R]	1.6667	.98473	12
		[R+NE]	3.3846	1.04391	13
		Total	1.7600	1.36367	50
	Total	[S]	.6923	.67937	26
		[M]	1.0833	.82970	24
		[R]	1.7143	1.05560	21
		[R+NE]	3.1739	1.07247	23
		Total	1.6277	1.31152	94

Note: mean = mean score of the judgment of bad collocations;
The maximum score for judging bad collocations of easy and complex patterns were both 4.
N= number of participants.

An ANOVA of the judgment of bad collocations (with attention and level as between-subjects factors and complexity as a within-subject factor) showed:

(1) Proficiency level did not have its significant main effect ($F(1, 86) = .001$, $p = .971$, $\eta_p^2 = .000$);

(2) Collocational complexity had its significant main effect ($F(1, 86) = 8.587$, $p = .004$, $\eta_p^2 = .091$), with the mean score of *wield* and *warp* (simple rules) being significantly lower than that of *make* and *take* (complex rules);

(3) Attention had its significant main effect ($F(3, 86) = 53.648$, $p= .000$, $\eta_p^2 = .652$).

A post-hoc Scheffé test of the effect of attention showed that the two rule-oriented groups (*rule given* and *rule given plus negative evidence* groups) significantly outperformed the other two non-rule-oriented groups (*semantic processing* and *memorization for recall* groups). Moreover, the *rule given plus negative evidence* group significantly outperformed the *rule given* group (See Table 37). These patterns are consistent with Hypothesis 6.

Table 37 Post-hoc Scheffé test of the effect of attention on the judgment of bad collocations

Attention	Attention	Mean difference	Std. error	Sig.
[S]	[M]	-.0737	.21226	.989
	[R]	-.8416(*)	.22000	.004
	[R+NE]	-2.4741(*)	.21464	.000
[M]	[S]	.0737	.21226	.989
	[R]	-.7679(*)	.22406	.011
	[R+NE]	-2.4004(*)	.21880	.000
[R]	[S]	.8416(*)	.22000	.004
	[M]	.7679(*)	.22406	.011
	[R+NE]	-1.6325(*)	.22632	.000
[R+NE]	[S]	2.4741(*)	.21464	.000
	[M]	2.4004(*)	.21880	.000
	[R]	1.6325(*)	.22632	.000

Note: mean= mean score of judgment of bad collocations;

* The mean difference is significant at the .05 level.

(4) The interaction between attention and complexity was not significant ($F(3, 86) = 1.561$, $p=.205$, $\eta_p^2 = .052$).

(5) The interaction between attention and level was not significant ($F(3, 86) = .948$, $p = .421$, $\eta_p^2 = .032$) (see Figures 13 and 14).

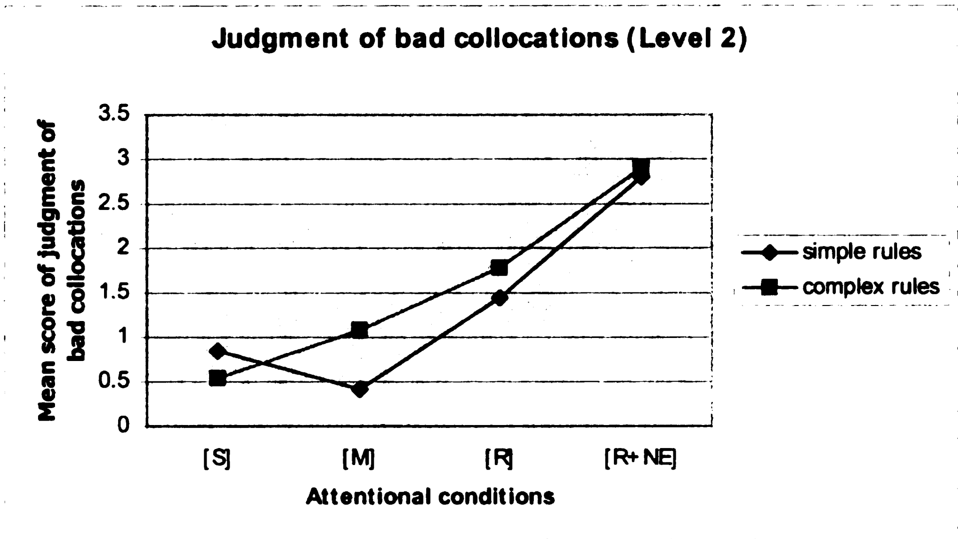

Figure 13 Judgment of bad collocations (Level 2)

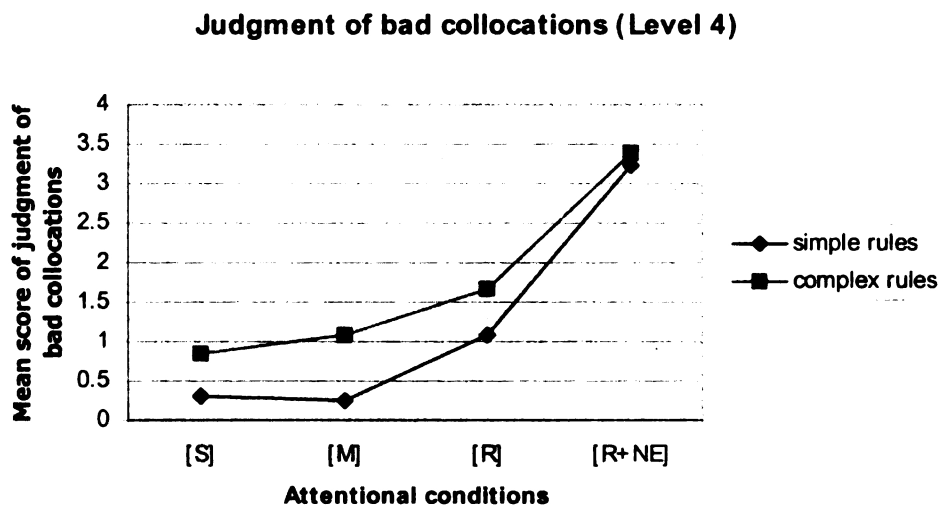

Figure 14 Judgment of bad collocations (Level 4)

4.4. Summary of the test results

Table 38 summarizes the major results of this experiment.

Table 38 Summary of the test results

Tasks in the test	**Attention**	**Level**	**Complexity**	**Attention* level**	**Attention*complexity**
Acquisition of the meaning of the target verbs	no main effect	no main effect	no main effect	no significant interaction	no significant interaction
Production of old collocates	[M], [R], [R+NE] >[S]	IV> II	simple > complex	II: [R]>[S] IV: [M],[R],[R+NE] >[S]	no significant interaction
Production of new target-like collocates	[R], [R+NE] > [M], [S]	IV>II	simple > complex	II: [R] > [M], [S] IV: [R], [R+NE] > [M], [S]	no significant interaction
Avoidance of non-target-like collocates in production	[R+NE], [R], [M] > [S]	no main effect	simple > complex	no significant interaction	no significant interaction
Production of semi-target-like collocates	no main effect	no main effect			
Judgment of good collocations	no main effect	IV>II	simple > complex		
Judgment of bad collocations	[R+NE] > [R] > [M], [S]	no main effect	complex> simple	no significant interaction	no significant interaction

Note: The ">" mark indicates more superior performance; The "," mark indicates no significant difference.

4.5. Rule detection

4.5.1. *Semantic processing* group

In the exit questionnaire, only 2 students from the *semantic processing* group (altogether 26 students) said that they paid some attention to the target noun collocates (one from Level 2, the other one from Level 4). This result is consistent with the assumption of the research design, that is, learners in the *semantic processing* condition were only exposed to the target collocational sequence, and their focal attention to the target collocations was limited to the greatest extent.

When asked to write down any collocational rule they had noticed for the four target verbs, among the 26 students in *semantic processing* condition, 13 could not write anything; 8 only listed some possible nouns or simply repeated the definition of the verb (e.g., "*warp* is followed by something that is made worse"); and 5 wrote some rules or a combination of rules and nouns. The rules figured out by the 5 learners were either irrelevant or incomplete and no one discovered any correct target rule. The rules relatively close to the targets were: 1) *wield* can be followed by something concrete (4 students), 2) *warp* can be followed by something abstract (1 student); 3) *warp* can be followed by thought and objects (1 student); 4) *make* can be followed by something abstract (1 student); 5) *take* can be followed by something abstract (1 student).

4.5.2. *Memorization for recall* group

When asked to write down any collocational rule they had noticed for the four target verbs, among the 24 students in *memorization for recall* group, 7 wrote nothing, 3 listed some possible noun collocates, 14 listed some rules. Obviously, compared to the *semantic processing* group, the memorization group had more students who were able to induce some rules. Moreover, their rules were more target-like. Table 39 displays the rules discovered by the learners on their own. The number in the parentheses indicates the number of participants who produced that rule.

Table 39 Detection of rules by participants in *memorization for recall* condition

Target verbs	Detected rules (number of participants who produced that rule)		
wield	a) weapon, concrete objects, or device(8)	b) abstract nouns (2)	c) nouns related to power (2)
warp	a) concrete objects, furniture (9)	b) abstract nouns (1)	c) nouns about personality, view, thought, feeling (5)
make	a) abstract nouns (3)		
take	a) abstract nouns (4)	b) action or physical action (2)	

4.6. Rule recall

In the exit questionnaire, learners from the *rule given* and *rule given plus negative evidence* conditions were asked to recall the collocational rules they learned during the treatment. Their answers could be divided into 3 major types:

(1) No recall of the target rules, that is, giving no answer, simply listing some nouns,

or producing a completely wrong rule.

(2) Partial recall of the rules, that is, giving incomplete rules or using synonyms to replace some of the words in the given rules. For example, some students wrote that *wield* could be followed by a tool or piece of equipment, while omitting the part "that could be carried and used". Some students said that *warp* could be followed by nouns related to "feeling" or "thought" rather than using the original word in the given rule: "mind".

(3) Production of complete and correct rules.

Tables 40, 41 and 42 show the mean number of rules that can be completely recalled, partially recalled and not recalled respectively within each level * attention condition. The total number of rules to be recalled is 8, with 2 for each target verb.

Table 40 Descriptive statistics of rules that can be completely recalled

Level * Attention	Mean	Std. Deviation	N
2 [R]	3.6250	2.19984	8
2 [R+NE]	4.7000	1.63639	10
4 [R]	4.7273	2.00454	11
4 [R+NE]	6.9231	1.49786	13
Total	5.1905	2.14406	42

Note: Mean = mean number of rules that can be completely recalled
N = number of participants

Table 41 Descriptive statistics of rules that can be partially recalled

Level * Attention	Mean	Std. Deviation	N
2 [R]	1.6250	1.06066	8
2 [R+NE]	1.6000	1.26491	10
4 [R]	1.3636	1.12006	11
4 [R+NE]	.6923	.85485	13
Total	1.2619	1.10563	42

Note: Mean = mean number of rules that can be partially recalled

N = number of participants

Table 42 Descriptive statistics of rules that cannot be recalled

Level * Attention	Mean	Std. Deviation	N
2 [R]	2.7500	2.12132	8
2 [R+NE]	1.9000	1.79196	10
4 [R]	1.9091	1.70027	11
4 [R+NE]	.3846	.96077	13
Total	1.5952	1.79511	42

Note: Mean = mean number of rules that cannot be recalled

N = number of participants

ANOVAs were performed on the results of rule recall, with level * attention condition as the independent factor. There were three findings:

(1) In terms of the mean number of rules that can be completely recalled, there was significant difference among the four level*attention conditions ($F(3, 38) = 6.430$, $p = .001$, $\eta_p^2 = .336$). A post-hoc Scheffé test revealed significant difference between 4[R+NE] and all the other three groups (i.e., 2 [R], 2 [R+NE] and 4 [R]).

(2) In terms of the mean number of rules that can be partially recalled, there was no significant difference among the four level*attention conditions ($F(3, 38) = 1.897$,

p= .146, η_p^2 = .130).

(3) In terms of the mean number of rules that cannot be recalled, there was significant difference among the four level*attention conditions (F (3, 38) = 4.004, p= .014, η_p^2 = .240). A post-hoc Scheffé test found that the significant difference lay between 2 [R] and 4 [R+NE].

4.7. Three-day treatment

Now we will return to the three-day treatment before the test. There are three parts in the treatment exercises, the answers of which are especially helpful to our understanding of the test results.

First, the exercise which asked learners to match the target verb with its meaning. All the participants, whatever their attentional condition, got the right answers.

Second, the exercise which asked learners from the two rule-oriented groups to match the given collocational rules with the instances in the reading passages. Learners did quite well in this. Only 1 student from the *rule given plus negative evidence* condition (Level 2) left this part blank for *wield* and *warp* on Day 1, and 2 students from the *rule given plus negative evidence* condition (Level 4) mismatched the two rules for *take* with the two target phrases on Day 1.

Third, understanding of the negative evidence provided. As described in Chapter 3, when the *rule given plus negative evidence* group was informed that a particular sentence containing an inappropriate collocation of the target verb was bad, they were also asked "Why do you think is this sentence bad?" Most students referred to the collocational inappropriateness in the answers. But there were also some answers indicating that the student did not pick up the message conveyed by the negative evidence, for example, leaving it blank, providing an irrelevant reason, saying "I don't know", or insisting that the sentence was good. Table 43 shows the number of participants who gave these unsatisfactory answers.

Table 43 Non-understanding of negative evidence in *rule given* and *rule given plus negative evidence* groups

Level*attention/Day		Number of participants who did not seem to understand the intention of the negative evidence			
		wield	***warp***	***make***	***take***
2 [R+NE]	Day 1	3	3	3	1
	Day 2	2	2	4	1
	Day 3	0	2	0	2
4 [R+NE]	Day 1	0	2	4	3
	Day 2	3	4	2	1
	Day 3	1	1	2	1

There are two notable features in Table 43:

1) On Day 3, for both proficiency levels, the number of participants who misunderstood the negative evidence was reduced compared to the previous two days;

2) There was not very salient difference between Level 2 and Level 4, in terms of the

number of participants who did not seem to understand the meaning of the negative evidence.

In this chapter, I have reported the major results of the experiment. The following chapter aims to provide possible explanations for these results and discuss their implications.

CHAPTER 5

Analysis and discussion

This chapter will evaluate and interpret the results of the experiment according to the following outline:

(1) Attention and acquisition of the basic meaning.

(2) Attention and production of collocates. (There will be analysis of the overall effect of attention and its interaction with proficiency level in the production of old collocates, new target-like collocates and non-target-like collocates[5]. Moreover, the NS judgment of IL production will be discussed.)

(3) Attention and judgment of collocations. (The effect of attention on the judgment of good collocations and bad collocations will be discussed separately.)

(4) The lack of interaction between attention and collocational complexity.

(5) Integration of the analysis.

The first three parts focus on the effect of attention and its interaction with proficiency level that have been observed in various tasks of the experiment test. The fourth part explains why in the current research the effect of attention was not mediated

[5] Semi-target-like collocates are not discussed in the analysis, because they are considered as borderline cases. And different from the cases that fall into quite clear-cut categories, these borderline cases might not be able to offer a clear window onto the relationship between the type of attention learners pay to the input and what learners can gain from the input.

by the factor of collocational complexity. The last part aims to integrate the interpretations and conclusions made in previous parts and relate them to the three research questions put forward in Chapter 3. Again, for the sake of simplicity, the target verbs in the experiment will be written as *wield, warp, make* and *take* rather than the original pseudo-forms.

5.1. Attention and acquisition of the basic meaning

In Part I of the test, all the participants got the right answers when asked to choose from four options a word/phrase which had a meaning closest to that of the target verb. To interpret this result, we need to consider two issues in the experimental procedure: (1) what type of meaning knowledge was examined by the test; (2) how learners processed the basic meaning of the target verbs during the treatment.

First, we will analyze what kind of meaning knowledge was assessed by Part I of the test. Laufer and Goldstein (2004) conceptualized the knowledge of meaning-form relationship as a hierarchy of four degrees of strengths, in which some degrees of knowledge are considered as more advanced than others: *passive recognition, active recognition, passive recall* and *active recall*. This hierarchy is based on two distinctions: (1) active knowledge (i.e., providing the form for a given meaning) vs. passive knowledge (i.e., providing the meaning for a given form); (2) recall (i.e., being able to recall the form or meaning of a word) vs. recognition (i.e., being able to recognize the form or meaning or a word in a set of choices). Laufer and Goldstein further argued that if active knowledge is more difficult to acquire than passive knowledge and if recall is more difficult than recognition, then the most advanced knowledge in this hierarchy is *active recall* and the least advanced is *passive recognition*. In the present experiment, Part I of the test asked learners to choose the meaning of a word from a set of options, which falls into the category of *passive recognition*. If the assumption by Laufer and Goldstein is correct, we may say that the type of meaning knowledge assessed by the test was the least advanced and the easiest to achieve.

Second, we need to take a closer look at how learners processed the basic meaning of the four target verbs during the three-day treatment. Each day the participants encountered the target verbs in the manners shown in Figure 15:

Step 1:
Processing the meaning of the four target verbs embedded in Passage 1 and being able to consult the margin glossing for the meaning of the verbs

→

Step 2:
Processing the meaning of the four target verbs embedded in Passage 2 and being able to consult the margin glossing for the meaning of the verbs

→

Step 3:
Doing an exercise which required learners to match the four target verbs with their meaning

→

Step 4:
Doing an exercise that aimed to manipulate learners' attention to the target collocations in a particular way, which might have led to different levels of attention to the meaning of the target verbs

Figure 15 **Processing of the meaning of the target verbs**

During the 1st and 2nd steps, the margin glossing could promote noticing of the target verbs and their basic meaning. At step 3, the nature of the task required all the participants to pay focal attention to the meaning of the target verbs. At step 4, as indicated in the above figure, learners' attention to the basic meaning of the target verbs was different as a result of different task demands. Under the *semantic processing* condition, learners were asked to look for a word with a particular meaning in a sentence containing the target verb. To do this, they might need to review the meaning of the target verb to see whether it was the word that matched the given meaning or perhaps they could immediately identify the answer while ignoring the target verb at all. Under the *memorization for recall* condition, very likely the memorization of the phrases was based on meaning comprehension, so learners needed to process the meaning of the target verbs again. As to the *rule given* and *rule given plus negative evidence* groups, the collocational rules presented to them were actually closely related to the basic meaning of the target verbs, because, as mentioned in Chapter 2 (2.1.1.2.), a word's collocational feature can be regarded as about a word's finer shade of meaning. It appears, then, that the two rule-oriented groups were processing the meaning of the target verbs at a deeper level than the other two groups, moving from rough categorization and a vague idea about the general meaning to more precise mastery of meaning.

Considering the fact that in the test all the participants could recognize the meaning of the four target verbs, we may suggest that *passive recognition* of a word, which only requires a quite shallow level of meaning knowledge, can be attained when the following conditions are all satisfied: (1) noticing and encountering its use in a sentence (in this experiment at least 4 times each day and for 3 consecutive days); (2) being informed of its basic meaning (in this experiment, margin glossing was provided 2 times each day and for 3 consecutive days); (3) doing exercises that explicitly focus on its basic meaning (in this experiment 1 exercise each day and for 3 consecutive days). Any more elaborate level of meaning processing, as the one experienced by the *rule given* and *rule given plus negative evidence* groups, does not seem to be necessary for successful *passive recognition*.

5.2. Attention and production of collocates

5.2.1. Production of old collocates

5.2.1.1. Overall effects of attention

Overall, the *memorization for recall, rule given* and *rule given plus negative evidence* groups produced significantly more old collocates than the *semantic processing* group. Before interpreting this result, let us first review the four groups' level of attention to the target collocations:

(1) *semantic processing* group -- peripheral attention (mere exposure to the target word sequence and meaning comprehension);

(2) *memorization for recall* group -- focal attention at the level of phrase chunking and storage (meaning comprehension and maintenance rehearsal, i.e., cycling the target phrases in STM through a "phonological loop");

(3) *rule given* group -- focal attention at the level of rule understanding (meaning comprehension and elaborative rehearsal, i.e., explicitly learning and testing the underlying patterns);

(4) *rule given plus negative evidence* group -- focal attention at the level of rule understanding and knowledge of what are impossible combinations (meaning comprehension and elaborative rehearsal).

In short, the *memorization for recall*, *rule given* and *rule given plus negative evidence* groups directed more focal attention to the target phrases and had more elaborate processing of them than the *semantic processing* group.

The superiority of the three focal attentional conditions over the non-focal attentional condition in producing old collocates is consistent with the view summarized in Chapter 2. That is, processing new lexical information more elaborately and from more dimensions will lead to higher retention than processing new lexical information less elaborately. It also fits in with the argument by Gass (1988a) that one factor determining whether a particular instance of comprehended input will become intake or not is the level of input analysis a learner achieves. According to Gass, an analysis at the level of meaning, that is, having a general understanding of the message, might not be as useful for intake as a mini-linguistic structural analysis (e.g., analysis at the level of syntax). In this study, participants in the *semantic processing* group made an analysis of the target phrases only at the level of meaning comprehension, and it seems that the target phrases' record in their memory tended to be fleeting. In contrast, the other three groups made richer encoding of the collocations, especially the two rule-oriented groups who performed certain structural analysis of the verb's collocational features, so their retention of the target phrases tended to be much more long-lasting.

At this point, I am going to look at another two issues in the result: (1) The two rule-oriented groups produced more old collocates than the *memorization for recall* group; (2) but the superiority lacked statistical significance.

First, why were the rule groups able to produce more old collocates than the memorization group? As previously analyzed, the major cognitive process under the *memorization for recall* condition is maintenance rehearsal, which involves holding information over a brief period of time. For the two rule-oriented conditions, the dominating process is elaborative rehearsal, which involves the learning and testing of rules and the embedding of new information into old knowledge system. It has been assumed that maintenance rehearsal simply prevents forgetting during the process of maintenance or primes existing units (i.e., making a particular representation active) without transforming the information into a deeper code, and it is unlikely to lead to substantial long-term learning; on the other hand, elaborative rehearsal can result in an increase in the depth at which an item is encoded, promote the establishment of new associations between two previously separate items, and thus facilitate long-term learning (see Baddeley, 1997; Craik & Lockhart, 1972; Craik & Watkins, 1973). These views can explain the fact that the two rule-oriented groups recalled more old collocates than the memorization group.

But why was the gap between the rule-oriented and memorization condition so close that there was no statistical significance? This might be related to the complex interaction between maintenance and elaborative rehearsal. As reviewed in Chapter 2 (2.3.1. and 2.3.2.2.), when representations of input accumulate in memory, inductive learning mechanisms might automatically extract generalizations, so repetition may create new learning rather than simply perpetuating the status quo. Craik and Lockhart (1972) pointed out whether repetition of an item strengthens the memory trace or merely postpones forgetting depends on what the subject is doing with his rehearsal and only deeper and richer processing will lead to an improvement in memory. A similar view was expressed by Baddley (1997). According to him, although priming and associative learning have been discussed as if they were quite separate processes, in reality many situations involve some elements of both and the distinction between maintenance and elaborative rehearsal is not as absolute as at first seemed likely. In the current experiment, the phrase memorization task might have enabled learners to come up with certain explicit or implicit rules (i.e., rules that can or cannot be verbalized) that help them organize and retain the input, so learners in the memorization condition were not simply repeating the phrases. The research design is not able to detect learners' knowledge of implicit rules, but the result of the exit questionnaire did show that some participants from the memorization group acquired a mixture of instances and explicit collocational rules. In short, the lack of statistically significant superiority of the rule-oriented groups over the memorization group in recalling old phrases can be attributed to the possibility that members under the memorization condition possess a blend of instances and rule-based knowledge.

Before concluding the analysis of the overall effect of attention on the production of old collocates, I would like to discuss another interesting phenomena reported in Chapter

4. That is, the *semantic processing* group was the most inferior not only in the mean NUMBER of old collocates produced but also in the TYPES of old collocates produced. Some of the target noun collocates were able to be recalled ONLY by learners from the *memorization for recall*, *rule given* and *rule given plus negative evidence* groups, and not the *semantic processing* group: (1) *mind* (collocate for *warp)*, (2) *recovery, progress, claim* (collocates for *make*), (3) *lead, role* (collocates for *take*). These nouns share one common feature: they all denote something abstract, with the target verb used in its figurative or delexical sense. We may get two implications from this result: First, when a verb is used in its literal sense and the following noun denotes something concrete, the verb+noun combination might be stored in LTM through mere semantic processing, although, as analyzed earlier, the retention chance is much lower compared to the focal attention conditions; Second, when a verb is used in its figurative or delexical sense and the following noun denotes something abstract, there is a higher demand on focal attention for learners to keep the verb+noun combination in LTM.

5.2.1.2. The interaction between attention and proficiency level

In the production of old collocates, the effect of attention was mediated by the factor of proficiency level. It was found that for Level 2 learners, the *rule given* group still significantly outperformed the *semantic processing* group; however, the advantage of the *memorization for recall* and *rule given plus negative evidence* conditions over the *semantic processing* condition was not statistically significant. This part attempts to analyze the reasons why the behavior of the *memorization for recall* and *rule given plus negative evidence* groups of Level 2 was deviant from the overall pattern.

5.2.1.2.1. The *memorization for recall* group (Level 2)

One issue to be addressed here is why, different from Level 4, for Level 2 participants the superiority of the *memorization for recall* group over the *semantic processing* group fell short of statistical significance. This differential effect of attention might be related to the different processing features of Level 2 and Level 4 learners.

A number of authors have argued that to master complex cognitive tasks, two types of operations are required to be integrated -- controlled processes and automatic processes[6] (see e.g., Schneider & Shiffrin, 1977; Shiffrin & Schneider, 1977). Controlled processes are subject to the attentional control of a person. They require relatively large amounts of processing capacity and time, so they are slow, inefficient, and limited by the capacity of STM. Automatic processes take much less processing energy, so they are fast, efficient, not limited by the STM capacity and difficult to suppress or modify. According to Shiffrin and Schneider, the development of cognitive skills involves a shift from

[6] These two concepts were touched upon in previous parts of this dissertation, and here a more formal and complete characterization of them is provided.

controlled to automatic processing, which results from repeated exposure and rehearsal. Novice learners need to pay careful attention to every component of the task. But advanced learners, as a result of practice, may be able to process more information automatically and controlled processes are free to be allocated to higher-level subtasks or other components of the task. From these perspectives of information processing, L2 learning is thought to be regulated by controlled processes, in which complex skills become automatic only after the earlier use of controlled processes (see e.g., McLaughlin, Rossman, & McLeod, 1983; McLeod & McLaughlin, 1986).

In the current study, when Level 2 learners (the lower-level learners) were asked to memorize the target phrases for a later recall test, they might still need to consume most of their attentional resources on certain surface elements, like the form and meaning of each individual word. That is, there were many elements in the input that were still subject to controlled processing. However, for Level 4 learners (the higher-level learners), the mastery of more advanced knowledge and skills in English might have enabled them to process more input effortlessly and automatically so that some of their attentional resources were freed up for deeper-level processing of the input, for example, discovering the underlying regularities of the collocations. In other words, Level 2 learners tended to process the target phrases in a more shallow level than Level 4 learners. Because it is deeper coding rather than sheer repetition of the phrases that enhances their long-term retention (see 5.2.1.1), the memorization tasks were less effective with Level 2 learners than with Level 4 learners.

5.2.1.2.2. The *rule given plus negative evidence* group (Level 2)

The second question to be answered is why for Level 4 the *rule give plus negative evidence* group had statistically significant advantage over the *semantic processing* group in producing old collocates, but for Level 2 this is not the case. This differential effect of attention might be again associated with the different processing features and capacity of Level 2 and Level 4 learners.

Chapter 2 (2.2 and 2.5.4) has reviewed two important features of attention: (1) Attentional capacity has its limitations and once this limit is exceeded learning is impossible; (2) The effect of attention interacts with proficiency level in the sense that externally-driven focus on a new item is effective only when learners are proficient enough to release attention for that particular item during input processing. As suggested in 5.2.1.2.1, for higher-level learners, the amount of knowledge they have acquired enables them to handle more information routinely and "effortlessly" than lower-level learners and a subtask that once took up a lot of processing capacity may become so automatic that it requires little processing energy, thus advanced learners have more attentional resources than the less advanced ones to process new information. In other words, the attentional resources of an L2 learner can be constrained by the degree of automaticity he/she has over comprehension and production in their L2.

In this study, it is possible that when facing the input presented for the *rule given plus negative evidence* condition (i.e., positive evidence, rules and negative evidence), Level 4 learners could attend to, deal with and organize it quite effectively within the given time, including storing in LTM the collocates that appeared in the passage. However, for Level 2 learners, those task demands may have overloaded their limited capacity system in such a way that their storage of the old collocates was distracted rather than facilitated. As suggested by Baddeley and Hitch (1974), once the working memory limits were exceeded, there would be a trade-off between the total amount of information that could be retained and the efficiency in processing the information that comes in later. As a result, some of the stored information would be forgotten, and/or processing would be erroneous or be slowed down.

In sum, Level 2 learners were able to process and assimilate less amount of English input stimuli than Level 4 learners within the same length of time, and the input presented in the *rule given plus negative evidence* condition may have exceeded their processing capacity, so certain negative effects were found (in this case, the retention of old collocates was influenced). However, for Level 4 learners, who tended to be more efficient input processors, the amount of information provided in the *rule given plus negative evidence* condition was still manageable, so no side effects were observed.

5.2.2. Production of new target-like collocates

5.2.2.1. Overall effects of attention

As reported in Chapter 4, in general, the *rule given* and *rule given plus negative evidence* groups produced significantly more new target-like collocates (i.e., new collocates that were consistent with the target rules) than the *memorization for recall* and *semantic processing* groups. To understand the implications of this result, we need to look at the fundamental difference between the *rule given*, *rule given plus negative evidence* groups on the one hand and the *memorization for recall*, *semantic processing* groups on the other hand.

For the *rule given* and *rule given plus negative evidence* groups, they were presented with collocational rules and guided in explicit discussions about the target collocational features. As described in Chapter 4, during the treatment stage, most learners in the two conditions could follow the discussions quite well and complete the rule matching activity satisfactorily. Moreover, when they were asked to recall the target rules in the exit questionnaire, most of them could write down parts or all of the rules. In other words, the two experimental conditions were successful in inducing focal attention at the level of understanding collocational rules.

For the *memorization for recall* and *semantic processing* groups, no rules were explicitly given to them. The exit questionnaire shows that only a small number of learners in the *semantic processing* condition could verbalize any collocational rules, and those verbalized rules were not the same as the target rules. As to the *memorization for recall* group, although there were more participants explicitly talking about certain collocational rules in the questionnaire, very few of the patterns found by learners themselves were the same as the target rules.

In short, the basic difference between the *rule given, rule given plus negative evidence* groups and the *memorization for recall, semantic processing* groups was whether the learners possessed any explicit knowledge of the underlying collocational rules. The significant superiority of the two rule-oriented groups over the two non-rule-oriented groups in the production of new target-like collocates suggests that focal attention at the level of explicit rule knowledge can speed up the acquisition of certain recurrent pattern in collocational behavior and learners do use the rules to make new creations. Without the rule-level focus, learners tend to ignore the underlying collocational regularities or fail to find the correct patterns, at least when the encounters with the target collocations are limited to a few times, so, not surprisingly, their production contains fewer new collocates that follow the re-occurring pattern. Here, I do not rule out the possibility that with numerous encounters and longer learning time, even learners in the non-rule-oriented condition may automatically develop a sense of a word's frequent type of collocates. However, compared to the rule-oriented condition, this learning process is obviously much slower and less efficient.

To sum up, the positive effect of explicit rule formulation observed in this part of L2 collocation learning is quite similar to what was found in some studies of L2 syntax learning (see the review in 2.5.1.3.). That is, rule-based condition helps learners bring order to the input and also enables them to generalize the knowledge to novel instances.

5.2.2.2. The interaction between attention and proficiency level

Like the production of old collocates, in the production of new target-like collocates, the effect of attention was also mediated by proficiency level and it was again Level 2 learners who deviated from the overall pattern. As displayed in Chapter 4, for Level 2 learners, only the *rule given* group produced significantly more new target-like collocates than the *memorization for recall* and *semantic processing* groups, and the *rule given plus negative evidence* group did not have any significant difference with the two non-rule-oriented groups, although there was a trend toward an advantage for the *rule* *given plus negative evidence* condition. This result might be again related to the possibility that the addition of negative evidence overloaded the processing capacity of Level 2 learners, who were less effective information processors (see previous discussion in 5.2.1.2.2.), and it seems that the excessive amount of input not only inhibited Level 2 learners' LTM storage of old collocates but also interfered with their learning of the target collocational rules, which serve as an important basis for making new extensions in collocations.

However, as shown in Chapter 4, there was no significant statistical difference between the *rule given plus negative evidence* (Level 2) group and the *rule given* (Level 2) group in terms of the mean number of rules that could be completely recalled, partially recalled or not recalled in the exit questionnaire. In other words, the *rule given plus negative evidence* (Level 2) group did as well as the *rule given* (Level 2) group in verbalizing the collocational rules. Then why the former group did not have the same superiority over the two non-rule-oriented conditions as the latter in producing new target-like collocates? And in what sense did the addition of negative evidence interfere with the learning of target rules among the *rule given plus negative evidence* (Level 2) group? The remaining part of this section will attempt to examine these two questions.

As stated in 5.2.1.2.1, controlled processing can be considered as laying down the "stepping stone" for the automatic processing as L2 learners makes progress towards more and more difficult levels. Following this line, we may speculate that the acquisition of collocational rules proceeds in several stages:

First, learners notice the underlying collocational rules. In this experiment, this is aided by external instructions.

Second, the rules might have been memorized or stored, but learners are not sure about how to apply them yet or the operation of the rules is still a controlled and effortful process. At this stage, learners might be able to verbalize the rules when they are required to do so, but target-like performance in language production is not guaranteed (also see previous literature review in 2.5.1.3.). This way of looking at learning is similar to the argument by Gass (1988a) that some input may be processed and put into storage if it is not yet possible to integrate it into the IL system and this storage can take the form of some kind of explicit representation of L2 items and rules.

Third, the originally controlled and attention-demanding operations of the rules become much faster and more automatic. At this stage, learners not only have rule knowledge but also become more efficient in making use of the rules to generate new instances in production.

It has to be noted that the stages proposed above may not be distinguished very clearly in real acquisition, because the process of automatization is a gradual and continuous transition from fully controlled processing to fully automatic processing (see Schneider & Detweiler, 1988).

In this experiment, it is possible that for the *rule given plus negative evidence* (Level 2) group, the information flood in the input did not make learners learn more. Instead, it delayed their progress from Stage 2 to Stage 3 in the acquisition of collocational rules. As a result, learners could verbalize the rules, but couldn't apply the rules in production as well as the *rule given* (Level 2) group did and their production of new target-like collocates failed to show statistically significant superiority over the two non-rule-oriented (Level 2) groups.

5.2.3. Production of non-target-like collocates

As reported in Chapter 4, the *memorization for recall*, *rule given* and *rule given plus negative evidence* groups produced significantly fewer number of non-target-like collocates (i.e., collocates deviating from the target rules) than the *semantic processing* group. The following analysis will focus on three major questions in this result:

(1) Why was the *rule given* group able to produce significantly fewer non-target-like collocates than the *semantic processing* group?

(2) Why did the *rule given plus negative evidence* group have no significant

superiority over the *rule given* group in avoiding non-target-like collocates?

(3) Why was the *memorization for recall* group able to produce significantly fewer non-target-like collocates than the *semantic processing* group?

5.2.3.1. The *rule given* group vs. *semantic processing* group

The superiority of the *rule given* group over the *semantic processing* group in avoiding non-target-like collocates has the following indications: although theoretically speaking, the presented rules only tell learners what are allowed in L2 but not what are disallowed, they seem to have the function of helping learners realize that they should be cautious with new creations and not all the nouns that are semantically compatible with the basic meaning of the verb are appropriate as its collocates. In other words, explicit knowledge of the recurrent patterns make learners prefer to produce collocates that comply with those patterns. On the other hand, the *semantic processing* group only paid peripheral attention to the target collocations, which was insufficient to induce awareness of any recurrent patterns. Without rules serving as constraints, it is not surprising that learners under the *semantic processing* condition produced much more collocates that did not observe the target rules.

5.2.3.2. The *rule given plus negative evidence* group vs. *rule given* group

Different from the *rule given* group, the *rule given plus negative evidence* group was presented with not only the collocational rules, but also the information that some nouns semantically compatible with the basic meaning of the verb may not be suitable as its collocates. Moreover, according to Chapter 4, the majority of the participants (both Level 2 and Level 4) could understand the message conveyed by the negative evidence, considering their answers to the question "Why do you think is this sentence bad?".

In short, the *rule given plus negative evidence* group learned the combinational restrictions both from positive evidence (recurrence of certain patterns) and from negative evidence. Theoretically speaking, it should have more keen awareness of the restrictions than the *rule given* group and produce fewer non-target-like collocates. Then why did its superiority over the *rule given* group fall short of statistical significance?

One possibility is that negative evidence is not useful at all. This is not likely, because we did observe a trend towards an advantage for the *rule given plus negative evidence* group. Moreover, in terms of judging bad collocations (an item in the judgment test), the *rule given plus negative evidence* group achieved significantly higher mean score than the *rule given* group. These facts indicate that negative evidence is useful in constraining learners' hypothesis. But why did it show obvious facilitative effect in judgment test but not in production test?

This is an issue related to task-induced variation. Many studies have reported that IL may vary when learners perform different tasks. For example, in a study on second-verb ellipsis in sentences like *Stella is eating a banana and Alice an apple*, M. Schmidt (1980) found that in free speech learners always included the second verb, but they increasingly omitted it in tasks like written sentence-combining and grammaticality judgment. According to Hyltenstam (1984), different tasks (i.e., written composition, grammaticality judgments and oral picture description task) resulted in both quantitative difference in IL (i.e., more or less target-like behavior) and qualitative differences (i.e., different or even contradicting rules).

Various reasons have been put forward to account for the observed task-induced variation. M. Schmidt (1980) argued that substantial differences arise depending on the degree of monitoring that different tasks permitted R. Ellis (1994a, p. 140) claimed that the variation is related to whether the task permits or encourages the use of metalingual knowledge or whether it taps "communicative" behavior. According to Lococo (1976), learners' perception of the task might be one factor influencing the results. Learners might focus on accuracy in a translation task and on expressing ideas in a picture description task. Tarone (1982) maintained that when learners pay attention to their speech, controlled processes come into play, so their performance is likely to be different from that in informal settings. Taking these views as a whole, we may draw the following conclusion: Task-induced variation may occur when a particular language item hasn't been automatized yet. In that case, if a task allows enough time for controlled processing, encourages the application of explicit rules, or is perceived to be focusing on accuracy rather than just communication, IL production tends to be more target-like; otherwise, the IL performance may deviate from the target norm.

In the current experiment, when learners were asked to judge whether a sentence was a good English sentence or not and also identify any error, it might be a natural tendency for them to draw on their explicit knowledge about how English should work and then use that as the criterion for judgment. In other words, the judgment test is a format that encourages the use of metalingual knowledge. On the other hand, the production test, which asked learners to write as many noun collocates as possible within a given time, was more implicit in tapping learners' rule knowledge. Learners might have focused on retrieving those nouns they considered as semantically suitable for the verb, while ignoring the collocational knowledge they have stored, unless the knowledge has been automatized or the experimental time was long enough for controlled processing. So, compared to the judgment test, target-like performance in the timed production test relies more on a learner's ability to apply knowledge automatically.

The fact that negative evidence showed its significant effect in the judgment test but not in the production test seems to imply that learners have stored the collocational restrictions conveyed by negative evidence, but it hasn't been acquired to the extent that it can be applied very fast or automatically in production. In other words, just like the gradual assimilation of the target collocational rules (see previous discussions in 5.2.2.2.), the integration of the information passed by the negative evidence may also develop in several phases: (1) understanding of the knowledge contained in the negative evidence → (2) storage of the knowledge, which might be utilized in a judgment test or in fully monitored production → (3) being able to operate the knowledge automatically in production. In this research, the participants under the *rule given plus negative evidence* condition might have only reached the second stage, so the effect of negative evidence was noticeable only in judgment but not in production.

This explanation leads to our final question in this section: why did the participants in the *rule given plus negative evidence* condition fail to reach the third stage in acquiring the information conveyed by the negative evidence? This might have to do with the timing of the focused attention, which was considered in Chapter 2 (2.5.4.). In the current experiment design, the negative evidence was presented immediately after the flood of positive evidence and rules. At that time, learners might not be developmentally ready for it yet. That is, they might need more time to digest the information conveyed by previous items (i.e, the positive evidence and rules), consolidate their knowledge base and gradually develop some emerging hypotheses about the collocational restrictions, before they are able to make full use of the negative evidence. As a result, the "premature" presentation of the negative evidence only led to rule or item storage that may be used in the judgment test, but not the type of automatic knowledge application demanded by the timed production test. As pointed out by previous research, direct instruction should be delayed until learners have shown at least some emerging knowledge of the form (Doughty & Williams, 1998) and "learner's emergent grammars modulate their apperception of the input and therefore the use they might make of explicit instruction" (Mackey, Philp, Egi, Fujii & Tatsumi, 2002, p. 203).

5.2.3.3. The *memorization for recall* group vs. *semantic processing* group

The third question with regard to the production of non-target-like collocates is why the *memorization for recall* group was able to produce significantly fewer non-target-like collocates than the *semantic processing* group. Previous analysis shows that very few members in the memorization group had explicit knowledge of the target collocational rules. So it seems that this group should have behaved like the *semantic processing* group in making overextensions, due to the lack of constraints from any rules or any correct rules. However, the reality is that the *memorization for recall* group was as good as the two rule-oriented groups and produced significantly fewer non-target-like collocates than the *semantic processing* group.

This result might be related to the task demands for the *memorization for recall* group in the treatment and test. During the treatment stage, this group was asked to memorize the target phrases and told that there would be a recall test of the phrases later. Then, in the test they were asked to produce as many noun collocates of the target verbs as possible. It might be a natural tendency for the learners to try their best to recall all those phrases they read before. As a result, the time left for making new creations was reduced, and when learners did try to produce novel collocates, they might have tried to produce those nouns that came from the same lexical field as the old ones (e.g., *(warp) a* ***bookshelf*** → *(warp) a* ***desk***). Because of these factors, the chance of producing non-target-like collocates was much lower for the *memorization for recall* group than for the *semantic processing* group, who was poor in both rule and instance knowledge. This explanation can gain some support from the results reported in Chapter 4: Overall, the *memorization for recall* group produced the fewest number of noun collocates and, different from other groups, among their production, old collocates tended to occupy a much larger percentage than new collocates.

5.2.4. NS judgment of IL production

Most new target-like collocates, that is, new collocates that are consistent with the target rules, were judged as good or OK by NSs. This is not surprising. However, it has to be noted that there were still some target-like collocates judged as bad by NSs. This can be accounted for by the nature of collocations as summarized in Chapter 2. That is, collocation is a PARITIALLY rule-governed system. Certain rules can capture the common features of the allowed combinations, but some phrases that comply with the rules seem to be excluded arbitrarily. Therefore, the rule-based extensions made by participants in this study were not always accepted by NSs. This complex nature of collocations indicates that both acquisition of rules and accumulation of instances might play a crucial role in learning L2 collocations. With this dual knowledge base, learners can develop a good sense of what are frequent combinations and what are infrequent.

Another issue is the NS judgment of non-target-like collocates. The results are somewhat different for *wield*, *warp* and *make*, *take*. For *wield* and *warp*, most non-target-like collocates were judged as bad and no non-target-like collocates were judged as good. However, for *make* and *take*, much more non-target-like collocates were judged as good or OK. This result has to do with the different collocational features of *wield/warp* and *make/take*. When *wield* and *warp* are used in the target basic meaning, their collocates are mostly limited to the two types of nouns displayed in the passages. But *make* and *take* are more collocationally active and can be combined with nouns from a variety of semantic fields. What were targeted in this experiment were only two types, so even if learners produced something outside the scope of the target types, there was still a good chance for the IL production to be acceptable.

5.3. Attention and judgment of collocations

5.3.1. Judgment of good collocations

In terms of the mean score of judging good collocations, attention did not have significant main effect and all the participants did this part very well. This might be related to the fact that they have successfully acquired the basic meaning of the target verbs. As shown in Chapter 3 (3.2.3.2.), in the eight good sentences used for judgment, except two phrases (i.e., *take a walk, make a shift*) in which the basic meaning of the target verb and the meaning of the following noun seem to have remote semantic and logic relationship, the combinations of the target verbs and their noun collocate are semantically quite transparent (e.g., *wield heavy swords, wield authority, the wood... warped, warp her personality, make the shortest speech, take the part of Hamlet*). Knowing the meaning of the words, very naturally the participants tended to judge the good sentences as good.

This result is consistent with the finding made by Fan (2004). In that study, 51 Mandarin speakers enrolled in 2nd-, 3rd-, and 4th-level English courses in a university in China were exposed to passages containing the margin glossing and collocational patterns of *germinate, muster, warp*, which were used in their metaphoric sense. The participants were placed into one of three attention conditions: [- focused attention] (attention directed towards aspects unrelated to the target collocational patterns, a condition comparable to *semantic processing* in this study), [+focused attention] (attention directed towards the targets in the form of collocational rule search, a rule-oriented condition resembling *rule given* in this study) and [++focused attention] (attention directed towards the targets in the form of collocational rule search and provision of negative evidence, a rule-oriented condition resembling *rule given plus negative evidence* in this study). In the test of that study, all the participants did very well in acquisition of the basic meaning of the target verbs and there was no significant difference among the three attentional groups in terms of the judgment of good collocations.

5.3.2. Judgment of bad collocations

In terms of the mean score of judging bad collocations, the *rule given plus negative evidence* and *rule given* groups significantly outperformed the *semantic processing* and *memorization for recall* groups. This again matched the result in Fan (2004), which found that the two rule-oriented groups (i.e., [++focused attention] and [+focused attention]) significantly outperformed the non-rule-oriented group (i.e., [-focused attention]) in judging bad collocations. These results reconfirm the conclusions made in 5.2.3., that is, explicit knowledge of rules helps learners narrow down their hypotheses concerning a word's possible collocates and enables them to recognize certain inappropriate combinations.

Moreover, the *rule given plus negative evidence* group significantly outperformed the *rule give* group in judging bad collocations, which shows the facilitative effect of negative evidence in preventing over-extensions. The detailed explanation was offered in 5.2.3.2., so it will not be repeated here. In Fan (2004), there was also a trend towards the advantage of the [++ focused attention] group (i.e., the rule-oriented group provided with both positive and negative evidence) over the [+focused attention] group (i.e., the rule-oriented group provided with positive evidence only) in judging bad collocations, but the superiority showed no statistical significance. This might be caused by these factors: (1) Like the current study, in Fan (2004), the negative evidence was presented immediately after the positive evidence, which might be too early for learners to fully integrate the information (see previous discussions in 5.2.3.2.). Moreover, in this study, after learners were informed that a particular sentence was bad, they were asked "Why do you think is this sentence bad", which was useful in promoting further thoughts on learners' side and facilitating learning; but in Fan (2004), learners were simply informed that a sentence was bad, without any further prompting question. As a result, the effect of the negative evidence might have been compromised. (2) The number of participants in Fan (2004) might not be large enough for it to be sensitive to the difference between the [+focused attention] and [++focused attention] group.

5.4. The lack of interaction between attention and complexity

As previously analysed, focused attention to the target collocations at the level of rule understanding had a facilitative main effect on the production of old collocates, new target-like collocates, non-target-like collocates and the judgment of bad collocations. However, in none of these tasks was the effect of attention mediated by the complexity of the target collocational rules, which was different from the prediction made in the research hypotheses.

One possible reason for the lack of interaction between attention and collocational complexity in this study is that the claimed difference between the collocational patterns of *make*, *take* and those of *wield*, *warp* did not exist at all. But this is not likely, because as reported in Chapter 4, *wield, warp* did produce results that were significantly different from *make, take*. In terms of producing old collocates, producing new target-like collocates and avoiding non-target-like collocates, learners' performance with *wield* and *warp* (simple patterns) was significantly better than that with *make* and *take* (complex patterns). These results are not surprising, considering that all these tasks could be facilitated by rule knowledge, and it is more difficult and effortful to discover, encode and assimilate the rules of *make* and *take* than those of *wield* and *warp*. Meanwhile, there is an interesting phenomenon that needs to be mentioned here. That is, in judging bad collocations, learners' performance with *wield* and *warp* (simple patterns) was inferior rather than superior to that with *make* and *take* (complex patterns). This might be related to the fact that in the sentences for judgment *make* and *take* were used in relatively more abstract sense and had more distant semantic relationship with the noun collocate, so learners tended to judge them as bad. In short, the claimed complexity difference between the collocational patterns of *make*, *take* and those of *wield*, *warp* did exist.

A more tenable explanation for the lack of interaction between the effect of attention and collocational complexity is that for the participants of this study *wield/warp* and *make/take* were both located in the middle of the complexity continuum, although they differ in the degree of complexity. As reviewed in Chapter 2 (2.5.3.2.), the effect of externally imposed focal attention may be influenced by the side of the complexity continuum the target learning items sit on. When the learning material is located on one of the two extremes, that is, very simple or very complex, the effect of focal attention to the underlying rules might not be that obvious. For very complex material, rule-oriented attention might only cause confusion; for very easy material, learners might detect the rules themselves, so the superiority of externally-driven focused attention will be again decreased. The effect of focused attention is most obvious when the material to be learned is in the middle of the complexity continuum. That is, the language pattern has certain degree of complexity and requires some efforts to be figured out, but the explanations of the pattern or rule are not too complicated and are able to be assimilated by the learners. These features might be exactly what the target items of this study have:

First, for the rules underlying the collocational behavior of *wield* and *warp*, although they are easier to figure out than those of *make* and *take*, the accurate target rules are still quite difficult to be found out by learners on their own and it is by no means easy to delimit the exact semantic border of the noun collocates on the basis of the limited number of input instances. For example, exposure to the noun collocates of *warp* in the passages (i.e., *stick, weapon, knife*) may make learners think that *warp* can be followed by noun collocates that denote concrete objects, but the input instances may not be sufficient for learners to hypothesize that *warp* can be followed by a specific type of concrete object, that is, a concrete tool or piece of equipment that can be carried and used. As shown in the exit questionnaire, no learners in the non-rule-oriented conditions (i.e., *semantic processing* and *memorization for recall* groups) could figure out the target rules of *wield* or *warp* on their own, although some of their findings were quite close to the targets

Second, for the rules underlying the collocational behavior of *make* and *take*, although they are more complex than those of *wield* and *warp*, it seems that all the participants in this research, both Level 4 and Level 2, were able to cope with the explicit instruction of the rules, and my research hypotheses seem to have underestimated Level 2 learners' ability to take in and make use of the quite complex rules. There are two factors that may have contributed to the success by Level 2 learners: (1) There were only 2 rules for *make* and *take* respectively and the rules and corresponding examples were repeated for multiple times during the treatment stage; (2) The Level 2 learners were university students who had learned English for at least 6 years, and they may have accumulated enough knowledge and skills to deal with the complex target rules, although they were less advanced than the Level 4 learners.

To sum up, for the participants of this study, both the hard and easy items targeted in this study fall into the middle range of the complexity continuum rather than at the very hard or easy extreme. Therefore, focused attention at the level of rule understanding was effective with both types of items.

5.5. Summary

I will now put together previous analyses of the experiment results and relate them to the three research questions of this study.

The first question is concerned with what type of attentional condition leads to the best gains in learning a verb's possible noun collocates.

The results of the present study offer evidence that focused attention at the level of rule understanding is the most facilitative. Explicit knowledge of collocational rules has multiple functions: it can help learners bring order to the input, retain the phrases they are exposed to, and narrow down hypotheses about a word's collocational possibility; and the rules are also used by learners in making new extensions. Within a length of time as short as the present study, mere semantic processing of the word sequences is insufficient to induce the discovery of the recurrent patterns. Therefore, learners under this condition are inferior in both LTM storage of the old phrases and new extensions; they also tended to over-generalize a word's collocational behavior. It is possible that with the increase of exposure to a word's collocations, learners under the *semantic processing* condition might detect certain regularities on their own, but obviously this process is much slower.

In this study, focused attention at the level of phrase chunking and memorization only showed its superiority in transferring the old phrases into LTM. However, the advantage of this condition may be beyond this for the following two reasons: (1) Collocation is a system characterized by rules and also a lot of seemingly arbitrary exclusions and inclusions. Dual knowledge of rules and instances might help to nurture a sense of combination frequency and make learners' production more native-like and idiomatic. (2) Explicit rule knowledge is useful when a word's collocational features can be captured by a small number of rules, but it is not necessarily so when the rules are miscellaneous and numerous, for example, those for delexical verbs. In the latter case, a more realistic way of learning might be simply paying some special attention to the phrases and gradually develop the knowledge of the word's frequent collocates. It has to be pointed out that these suggestions concerning the usefulness of a combination of rule-level and instance-level focal attention are speculative and further research is needed to address this issue. Moreover, we should always keep in mind that real situations very often involve components of both types of processes, as indicated by previous discussions about the interaction between maintenance and elaborative rehearsal.

A final point to make with regard to the best type of attentional condition is related to the role of negative evidence. From the current study, we can conclude that negative evidence in L2 collocations can be properly perceived by learners and is utilized by them. It can speed up the process of recovering from an originally over-extended collocational grammar.

At this point, we can also offer an answer to the question raised at the beginning of this dissertation, that is, why is the development of L2 collocational competence so difficult for learners? According to this study, focal attention is a crucial mechanism in the acquisition of L2 collocations. However, knowing a word's collocational features is not indispensable for meaning comprehension and those features tend to escape learners' focal attention (see discussion in 3.1.). Therefore, the development of collocational knowledge is relatively slow and learners tend to rely solely on the compatibility of basic meaning or L1 knowledge to combine words, which can cause various types of production errors (see the review in 2.4.1). Moreover, as mentioned in 2.4.1, learners make fewer errors with highly-frequent phrases. This might also be related to the attentional issue, that is, frequent exposure to certain items can induce learners' focal attention to them and thus promote learning.

The second research question I seek to address is whether the effect of attention is mediated by complexity of collocational patterns. This study observed no interaction, but this may not be used as evidence for a simple "no" answer to the question. It is possible that although the target items in this study display a difference in collocational complexity, none of them was either too easy or too hard for the participants. If there were certain very easy or very difficult items involved in the experiment, an interaction between attention and complexity may have been found. Further research is required to explore this issue.

The third research question is whether attention has differential effects on different proficiency levels. The results of this study support a "yes" answer; moreover, it turns out that the differential effects can be best accounted for with an information-processing approach, which considers the difference between lower-level and higher-level learners in the efficiency of input processing, that is, the ability to attend to, deal with and organize new information. Within the same amount of time, higher-level learners are able to deal with more information than lower-level learners, because advanced learners can handle more knowledge and skills automatically and have more attentional resources available for new information, while lower-level learners are more dependent on controlled processes which take up a lot of processing energy and time. In this study, Level 4 learners could deal with the input provided in the *rule given plus negative evidence* condition, but for Level 2 learners, the information seemed to have overloaded their processing capacity, and caused the interference with the retention of old collocations and also the assimilation of the instructed rules. Moreover, for higher-level learners, more attentional resources may be freed up for processing the input at a deeper level and abstracting regularities from linguistic stimuli, which can promote the transfer of language material into LTM. As a result, the *memorization for recall* condition was more effective with Level 4 students than with Level 2 students in facilitating the retention of the target phrases.

In short, in the current study, the lower- and high- level learners seemed to have processed the same input treatment differently, both in amount and depth. Therefore, the effect of attention varied.

Besides these, there are another two issues emerging from the study that are related to the theme of processing capacity. They are about the information processing features of learners as a whole, not just those of lower-level or higher-level learners.

The first is the integration of certain items into IL system. This is a dynamic and interactive process, which requires building up a series of well-learned, automatic procedures so that controlled processes are freed for new learning. In the current study, the learning of target collocational rules by the *rule given plus negative evidence* (Level 2) group and the assimilation of negative evidence by the *rule given plus negative evidence* (Level 2 and Level 4) groups seemed to have only progressed to the point of controlled processing. As a result, the knowledge representation was only strong enough to be reflected in tasks that tend to tap metalingual knowledge (e.g., rule recall and sentence judgment), but not a task that has higher demands on automatic processing (e.g., language production within limited time).

The second is the timing of focused attention. Focused attention to particular items is more effective when learners have acquired and consolidated enough background knowledge to be developmentally ready to handle those items. In this study, the negative evidence was provided immediately after a great amount of positive evidence rather than after learners were given enough time to fully digest previously learned information. This presentation of negative evidence might have been too early, so its effect was obvious only in the judgment test, a format that encouraged learners to make use of explicit rule knowledge they have stored.

To sum up, in this research, I found evidence that focal attention at the level of rule understanding and provision of negative evidence can speed up the learning of a verb's possible collocates. Moreover, the effect may not be immediately visible in language production and it will be most noticeable when the amount of input stimuli and timing of focused attention are compatible with learners' processing capacity and features.

Appendix A

Treatment exercises for *semantic processing* group (Day 1- Day 3)

Day 1 (*semantic processing* group)

Task 1: Please read the following two passages in 7 minutes. After this, you will be asked to do some exercises related to the passages.

Passage 1

For many of us, the Internet is a very important part of our life. We use it for communication, shopping, or getting all types of information, from news about rebels who surrounded a government building, while manding[1] sticks and throwing stones, to tips about how to prevent heat from nerting[2] the floor. However, the network has also caused some problems.	1.*mand*: to have and/or use something 2.*nert*: to change something for the worse
With the Internet placing a wealth of research papers at our fingertips, some students plagiarize[3]. To prevent this from happening, two graduate students at the University of California have devised a special computer program. "We will run students' paper through the program, voke[4] a look at every sentence, and compare each one with every other term paper on the web," said John, one of the program designers.	3. *plagiarize*: to take (words, ideas, etc.) from someone else's work and use them in one's own work without admitting one has done so 4.*voke*: to get something
A professor who teaches biology at U.C. Berkeley told his class that he would use the program. However, numerous students copied passages from others' work without citations[5] anyway. He ran all 300 papers through the program and found 45 of them, or 15 percent of students, had cut significant amounts of material from the Internet, dained[6] no changes and turned in the writing as their own work. Sometimes, students might be falsely blamed. In that case, they can have the opportunity to defend themselves. Competition is tough at famous universities like the University of California. Some students welcome the Internet research watchdog[7], considering it as justified. (230 words)	5.*citation*: a short note recognizing a source of information or of a quoted passage 6.*dain*: to produce something 7.*watchdog*: a person or organization that defends against illegal practices

Passage 2

Nowadays in many hospitals, when a patient calls for help, it's never a problem finding the nurse, because nurses all wear special badges[1]. Since the invention of the badge, many U.S. hospitals have voked[2] the lead in using it. It is actually a part of a wireless system, which uses infrared[3] signal to track nurses' movements on the floor.	1. *badge*: a small flat object worn to show a person's name, rank, job or membership in an organization 2. *voke*: to get something 3. *infrared*: a type of light that feels warm but cannot be seen
But some nurses worry that the devices will be used to listen in on private conversations and monitor their movements. "You know, it can be used to listen through a wall unit to nurses or even to patients in other rooms. I'm not wearing mine. It makes me feel that someone is trying to mand[4] control over us. I will still meet my patients' needs but I will not wear this badge," said Annette, one of the dozens of nurses who dained[5] the claim that they would never wear the badges and staged an active protest against them.	4. *mand*: to have and/or use something 5. *dain*: to produce something
However, Michael, a hospital official, said, "We are never interested in listening to gossip[6], gossip about a man with a nerted[7] mind, or someone's love affairs... What we are most concerned about is how long it takes nurses to respond to calls. We are interested in patient care." Many officials believe that once the nurses actually find out how useful the system can be for them and the patients, the system will become very popular. (230 words)	6. *gossip*: talk about other people's private lives 7. *nert*: to change something for the worse

Please go on to the following exercises. You may go back to the two passages for answers.

Task 2: Please answer the following questions **in one short sentence**. You will have 5 minutes to complete this task.

Passage 1

1. What is the purpose of the computer program devised by the two graduate students at the University of California?

2. What does this program check for in a student's paper?

3. Are there any students who welcome this special program?

Passage 2

1. What is the function of the badge worn by nurses in some hospitals?

2. Why do some nurses refuse to wear the badge?

3. According to hospital officials, what is the major purpose of using the monitoring system?

Task 3: Please match the words in the left column with the meanings provided in the right column.

1.nert __	a) to create something
2.mand __	b) to talk about others' private life
3.gossip __	c) to use something
4.voke __	d) to get something
5.dain __	e) to make something worse

Task 4: Please read the following sentences and look for a particular word according to the instruction. You have 5 minutes to complete this task.

1. Rebels surrounded a government building, while manding sticks and throwing stones.
In this sentence, which word means "to cause something to move rapidly through the air"?

____

2. Tips about how to prevent heat from nerting the floor are available on the Internet.
*In this sentence, which word refers to "a computer network"?*___________

3. We will run students' paper through the program, voke a look at every sentence, and compare each one with every other term paper on the web.

*In this sentence, which word means "a network"?*___________

4. ...15 percent of students had cut significant amounts of material from the Internet, dained no changes and turned in as their own work. Sometimes, a student might be falsely blamed.

In these sentences, which word means "to say that someone did something wrong"?

____

5. Since the invention of the badge, many U.S. hospitals have voked the lead in using it. It is actually a part of a wireless system, which uses infrared signal to track nurses' movements on the floor.

*In these sentences, which word refers to "a type of light"?*___________

6. "It makes me feel like someone is trying to mand control over us. I will still meet my patients needs but I will not wear this badge".

*In these sentences, which word refers to "to satisfy something"?*___________

7. Annette was one of the dozens of nurses who dained the claim that they would never wear the badges and staged an active protest against it.

*In this sentence, which word means "to show that you disagree with something"?*__________

8. We are never interested in listening to gossip, gossip about a man with a nerted mind, someone's love affairs... What we are most concerned about is how long it takes nurses to respond to calls.

*In these sentences, which word means "to reply"?*___________

Day 2 (*semantic processing* group)

Task 1: Please read the following two passages in 7 minutes. After this, you will be asked to do some exercises related to the passages.

Passage 1

It was six o'clock in the evening. Andrea left her office and drove her car onto the road to home. It seemed that everything went wrong that day. That morning, she had found rainwater had nerted[1] the front door of her house and it was hard to shut it. In the afternoon, her boss dained[2] a speech that was long and boring…When she was thinking about all these unpleasant experiences, she saw an old lady standing by the road, with a sign saying "Brockbourne". Normally, Andrea would never pick up a hitchhiker[3] when she was alone, thinking it was dangerous. However, the cold weather and the coming darkness made her feel sorry for the lady. Andrea stopped her car, and the lady hurried over. When the lady got into her car, the old lady said in a very weak voice, "Thank you -- I'm just going to Brockbourne."

Something in the way the lady spoke, and the way she never turned her head and stared continuously into the darkness ahead, made Andrea feel a little bit nervous. Careful not to turn her head, Andrea looked sideways[4] at her passenger. She studied the hat, the dirty dress, the arms with thick black hairs...thick black hairs? Hairy arms? Andrea's blood froze. This wasn't a woman. It was a man. All kinds of horrible scenes came to her mind: men manding[5] weapons or taking away victims[6] by force … She didn't know what to do. But then, an idea came to her.

After voking[7] a deep breath, Andrea suddenly stopped her car.
"My God!" she shouted, "A child! Did you see the child? I think I hit her!"

The "old lady" was clearly shaken by the sudden stop. "I didn't see anything," she said.

"I'm sure it was a child!" insisted Andrea. "Could you just get out and have a look? She held her breath. Would her plan work?

It did. The passenger slowly opened the car door and climbed out to check. As soon as she was out of the car, Andrea drove madly away...
(341 words)

1. *nert*: to change something for worse
2. *dain*: to produce something
3. *hitchhiker*: people who travel by getting rides in others' cars
4. sideways: toward one side
5. *mand*: to have and/or use something
6. *victim*: a person who is harmed or killed
7. *voke*: to get something

Passage 2

Sharon was married five years ago, but it's not a happy marriage. According to Sharon, "It seems that he always wants to mand[1] power over me. I was feeling... like depressed and even though I don't really show it. Self-interest has completely nerted[2] his judgment. I cannot tolerate it anymore. But I am also very worried about my kids if we get divorced[3]. "

"The effects of divorce on kids are problems that could last for many years and emerge in adulthood." Author Judith Wallerstein said, "When man-woman relationships move to center stage, all the ghosts of the parents' divorce might come out of the basement[4]."

Wallerstein studied 93 children over a generation. Her findings haven't been published in a medical journal, only in her book. She says children of divorce are more likely to abuse[5] drugs and dain[6] slow progress in their studies. Also, 40-percent of them avoid marriage themselves, and when they do marry, the marriages fail at nearly twice the usual rate. She also says, "These children define themselves as having a great deal of difficulty trusting and are very frightened that their relationships will fail.

But some researchers say Wallerstein might not be able to draw this conclusion from a small study. Factors other than JUST divorce should be studied, too. Moreover, the study has no comparison with so-called healthy families. Experts also suggest that one of the most important things to do after divorce is to find someone who can voke[7] the role of family counselor[8], and with whom you can express your feelings openly. (257 words)

1. *mand*: to have and/or use something
2. *nert*: to change something for worse
3. *divorce*: to end one's marriage by an official or legal process
4. *basement*: a part of a building consisting of rooms that are partly or completely below the level of the ground
5. *abuse*: to use or treat someone or something wrongly or badly
6. *dain*: to produce something
7. *voke*: to get something
8. *counselor*: a person who gives advice about problems

Please go on to the following exercises. You may go back to the passages for answers.

Task 2: Please answer the following questions **in one short sentence**. You will have 5 minutes to complete this task.

Passage 1

1. Why did Andrea stop her car when she saw an old lady standing by the road?

2. What did Andrea find about the old lady later?

3. How would you describe Andrea?

Passage 2

1. According to Wallerstein, does divorce (the official ending of a marriage) have long-term or short-term effects on children?

2. What problems might children of divorce have when they grow up?

3. Was Wallerstein's conclusion accepted by all researchers?

Task 3: Please match the words in the left column with the meanings provided in the right column.

1.nert __	a) to create something
2.mand __	b) to treat something wrongly
3.abuse __	c) to use something
4.voke __	d) to get something
5.dain __	e) to make something worse

Task 4: Please read the following sentences and look for a particular word according to the instruction. You have 5 minutes to complete this task.

1. That morning, she had found rainwater had nerted the front door of her house and it was hard to shut it.

*In this sentence, which word means "to close something"?*___________

2. In the afternoon, her boss dained a speech that was long and boring...

In this sentence, which word means "not interesting or exciting"? ___________

3. It was a man. All kinds of horrible scenes occurred to her mind: men manding weapons

or taking away victims by force ...

*In these sentences, which word means "a person who is harmed or killed"?*___________

4.After voking a deep breath, Andrea suddenly stopped her car.

*In this sentence, which word means "quickly and without warning"?*___________

5. It seems that he always wants to mand power over me. I was feeling... like depressed and even though I don't really show it.

*In these sentences, which word means "unhappy"?*___________

6. Self-interest has completely nerted his judgment. I cannot tolerate it anymore.

*In these sentences, which word means "to put up with something or somebody unpleasant"?*___________

7. She says children of divorce are more likely to abuse drugs and dain slow progress in their studies. Also, 40-percent of them avoid marriage themselves...

*In these sentences, which word means "to prevent something from happening"?*___________

8.Experts also suggest that one of the most important things to do after divorce is to find someone who can voke the role of family counselor, and with whom you can express your feelings openly.

*In this sentence, which word refers to "a person who provides advice about problems"?*___________

Day 3 (*semantic processing* group)

Task 1: Please read the following two passages in 7 minutes. After this, you will be asked to do some exercises related to the passages.

Passage 1

When we go to live in a new country, very often we will pass through several basic stages. This process is called "culture shock".	
Culture shock begins with the "honeymoon[1] stage". During that period, everything about the new culture is strange and exciting.	1. *honeymoon*: the holiday taken by a man and woman who have just got married
Unfortunately, the second stage of culture shock can be more difficult. After we have settled down into our new life, working or studying, we can become very tired and begin to miss our homeland, our family and friends. All the little problems, for instance, humid[2] weather that might nert[3] bookshelves, or a road closed for construction... seem to be much bigger when you face them in a foreign culture. You even wonder whether you have voked[4] a step in the right direction, that is, whether you should have come to this country at all. This period can be very difficult. Some visitors may develop unhealthy habits (smoking and drinking too much, being too concerned over contact with people from the new culture, etc.).	2. *humid*: (of air and weather conditions) containing extremely small drops of water in the air. 3. *nert*: to change something for worse 4. *voke*: to get something
The third stage of culture shock is called the "adjustment[5] stage". This is when you begin to realize that things are not so bad in the new culture.	5. *adjustment*: making oneself get used to something
The fourth stage can be called "at ease at last". Now you feel quite comfortable in your new surroundings. If you meet someone from your country who has just arrived, you can dain[6] some suggestions about how to deal with their culture shock.	6. *dain*: to produce something
There is a fifth stage of culture shock which many people don't know about. This is called "reverse[7] culture shock". Surprisingly, this occurs when you go back to your own country and find that you have changed and that things there have changed. The foreign culture has manded[8] great influence over you. Now you feel a little uncomfortable back home. Life is a struggle! (301 words)	7. *reverse*: turned towards the opposite direction 8. *mand*: to have and/or use something

Passage 2

Not everyone is curious about the cultures of other people. Sometimes a lack of communication or understanding can nert[1] a person's view of foreign cultures. However, there was one woman who, at a very young age, seemed to be more interested in the culture of other people than her own. She is Emily Carr, one of the most famous painters in the world.	1. *nert*: to change something for worse
Emily Carr was born in 1871, during the era[2] of Queen Victoria who voked[3] power in 1837. As a child, she found walking in the woods more attractive than playing with other children. She was particularly interested in the First Nations people and the Chinese people she saw in Victoria's Chinatown. Their culture and way of dressing seemed so different from her own. She was also captivated[4] by painting. She eventually traveled to San Francisco and Paris to study art.	2. *era*: a period of time that is marked by particular events 3. *voke*: to get something 4. *captivate*: to hold the attention of someone
As she became a strong and independent woman, Emily began to go on longer and longer trips into the wild forests to paint and draw what she saw. In the summer of 1895, after daining[5] a full recovery from a disease, she explored the wilderness along the Cowichan River with two other women and drew the native villages along the way. This required great bravery and strength. There were bears and wolves roaming[6] the land, robbers manding[7] knives... There were no police if she got into trouble and no telephone to call for help.	5. *dain*: to produce something 6. *roam*: to wander over a place 7. *mand*: to have and/or use something
Her paintings are now very famous and, although the dark colours may not be attractive to some people, they evoke[8] the beauty and mystery of the deep woods and the skill of a great artist. (269 words)	8. *evoke*: to make someone have a particular feeling

Please go on to the following exercises. You may go back to the passages for answers.

Task 2: Please answer the following questions **in one short sentence**. You will have 5 minutes to complete this task.

Passage 1

1. According to the passage, what does one usually feel when they JUST arrive in a foreign country?

2. After you settle down into your new life, working or studying, what might you feel then?

3. What does "reverse culture shock" mean?

Passage 2

1. As a child, does Emily Carr like playing with other kids or walking in the woods?

2. Has Emily ever got any education in painting?

3. How would you describe the colors of Emily's paintings?

Task 3: Please match the words in the left column with the meanings provided in the right column.

1.mand__	a. to attract somebody
2.nert__	b. to make use of something
3.captivate__	c. to create or produce something
4.dain__	d. to cause something to become worse
5.voke__	e. to get something

Task 4: Please read the following sentences and look for a particular word according to the instruction. You have 5 minutes to complete this task.

1. All the little problems, for instance, humid weather that might nert bookshelves, or a road closed for construction…, seem to be much bigger when you face them in a foreign culture.

*In this sentence, which word means "the activity of building something again"?*___________

2.You even wonder whether you have voked a step in the right direction, that is, whether you should have come to this country at all.

*In this sentence, which word means "the position towards which someone or something moves or faces"?*___________

3. If you meet someone from your country who has just arrived, you can dain some suggestions about how to deal with their culture shock.

*In this sentence, which word means "an unpleasant surprise"?*___________

4.The foreign culture has already manded great influence over you. Now you feel a little uncomfortable back home.

*In these sentences, which word is related to some bad feeling?*___________

5. Sometimes a lack of communication or understanding can nert a person's view of foreign cultures. However, there was one woman who, at a very young age, seemed to be more interested in the culture of other people than her own.

*In these sentences, which word means "the feeling of wanting to give your attention to something"?*___________

6. Emily Carr was born in 1871, during the era of Queen Victoria who voked power in 1837. As a child, she found walking in the woods more attractive than playing with other children.

*In these sentences, which word refers to "an area of land covered with a thick growth of trees"?*___________

7. In the summer of 1895, after daining a full recovery from a disease, she explored the wilderness along the Cowichan River with two other women and drew the native villages along the way.

*In this sentence, which word refers to "an area that doesn't have towns or roads built on it"?*___________

8. There were robbers manding knives, bears and wolves roaming the land...

*In this sentence, which word means "to wander over a place"?*___________

Appendix B

Treatment exercises for *memorization for recall* group (Day 1- Day 3)

Day 1 (*memorization for recall* group)

Tasks 1-3 were the same as the *semantic processing* group, except that the target collocations in the reading passages were highlighted for the *memorization for recall* group.

Task 4: Please try your best to **memorize the underlined phrases** in the following sentences **within 5 minutes (请在 5 分钟内尽量记住加下划线的词组)**. You may **NOT** use paper or pencil. You will be asked to recall (回忆) these phrases later.

1.Rebels surrounded a government building, while ***manding sticks*** and throwing stones.
2. It makes me feel like someone is trying to ***mand control*** over us.

3. Tips about how to prevent heat from ***nerting the floor*** are available on the Internet.
4. We are never interested in listening to gossip, gossip about a man with ***a nerted mind***, someone's love affairs...

5. We will run students' paper through the program, ***voked a look*** at every sentence, and compare each one with every other term paper on the web.
6. Since the invention of the badge, many U.S. hospitals have ***voked the lead*** in using it.

7....15 percent of students had cut significant amounts of material from the Internet, ***dained no changes*** and turned in as their own work.
8. Annette was one of the dozens of nurses who ***dained the claim*** that they would never wear the badges.

Day 2 (*memorization for recall* group)

Tasks 1-3 were the same as the *semantic processing* group, except that the target collocations in the reading passages were highlighted for the *memorization for recall* group.

Task 4: Please try your best to **memorize the underlined phrases** in the following sentences **within 5 minutes (请在 5 分钟内尽量记住加下划线的词组)**. You may **NOT**

use paper or pencil. You will be asked to recall (回忆) these phrases later.

1. It was a man. All kinds of horrible scenes occurred to her mind: men ***manding weapons*** or taking away victims by force ...
2. It seems that he always wants to ***mand power*** over me.

3. In the morning, she found rainwater had ***nerted the front door*** of her house and it was hard to shut it.
4. Self-interest has completely ***nerted his judgment***.

5. After ***voking a deep breath***, Andrea suddenly stopped her car.
6. Experts also suggest that one of the most important things to do after divorce is to find someone who can ***voke the role*** of family counselor...

7. In the afternoon, her boss ***dained a speech*** that was long and boring...
8. She says children of divorce are more likely to abuse drugs and ***dain slow progress*** in their studies.

Day 3 (*memorization for recall* group)

Tasks 1-3 were the same as the *semantic processing* group, except that the target collocations in the reading passages were highlighted for the *memorization for recall* group.

Task 4: Please try your best to **memorize the underlined phrases** in the following sentences **within 5 minutes (请在 5 分钟内尽量记住加下划线的词组)**. You may **NOT** use paper or pencil. You will be asked to recall (回忆) these phrases later.

1. There were robbers ***manding knives***, bears and wolves roaming the land...
2. The foreign culture has already ***manded great influence*** over you.

3. ...humid weather that might ***nert bookshelves***...
4. Sometimes a lack of communication or understanding can ***nert a person's view of foreign cultures***.

5. You even wonder whether you have ***voked a step*** in the right direction, that is, whether

you should have come to this country at all.

6. Emily Carr was born in 1871, during the era of Queen Victoria who ***voked power*** in 1837.

7. If you meet someone from your country who has just arrived, you can ***dain some suggestions*** about how to deal with their culture shock.

8. .. after ***daining a full recovery*** from a disease, she explored the wilderness along the Cowichan River with two other women…

Appendix C

Treatment exercises for *rule given* group (Day 1- Day 3)

Day 1 (*rule given* group)

Tasks 1-3 were the same as the *semantic processing* group, except that the target collocations in the reading passages were highlighted for the *rule given* group.

Task 4: In the passages you have just read, there are some new VERBS. When you learn a new verb, you should not only learn its basic meaning, but also pay attention to the type of nouns or noun phrases that often go with it. Please fill in the following blanks according to the instruction.

I. mand

In the two passages, the verb *mand* is followed by **TWO** types of nouns:

Type 1: nouns referring to a tool or a piece of equipment that can be carried and used.

Type 2: nouns related to the concept of power.

For instance,

1)...rebels who surrounded a government building, while ***manding sticks*** and throwing stones...

In this sentence, the noun following *mand* falls into Type ___, that is, nouns about

____

____.

2) It makes me feel like someone is trying to ***mand control*** over us.

In this sentence, the noun following *mand* falls into Type ___, that is, nouns about

____

____.

Do you think the two types of nouns are somewhat related to each other? If yes, in what way? ____

II. nert

In the two passages, the verb *nert* is followed by **TWO** types of nouns:

Type 1: nouns referring to objects that can be damaged by heat or water;

Type 2: nouns related to one's mind

For instance,

1)...tips about how to prevent heat from ***nerting the floor***...

In this sentence, the noun following *nert* falls into Type ___, that is, nouns about ______

____.

2)… gossip about a man with a ***nerted mind***, someone's love affairs...
In this sentence, the noun following *nert* falls into Type ___, that is, nouns about ______

____.

Do you think the two types of nouns are somewhat related to each other? If yes, in what way? ____

III. voke

In the two passages, the verb *voke* is followed by **TWO** types of nouns.

Type 1: nouns referring to physical action

Type 2: nouns related to a particular role, especially one of leadership

For instance,

1) Since the invention of the badge, many U.S. hospitals have ***voked the lead*** in using it.
In this sentence, the noun following *voke* falls into Type ___, that is, nouns about ______

____.

2) We will run students' paper through the program, ***voke a look*** at every sentence …
In this sentence, the noun following *voke* falls into Type ___, that is, nouns about ______

____.

In the above two *voke*+noun phrases, which word is more important in determining the total meaning of the phrase, *voke* or the following noun?

____

IV. dain

In the two passages, the verb *dain* is followed by **TWO** types of nouns.

Type 1: nouns related to speech action

Type 2: nouns related to changes

For instance,

1)...15 percent of students had cut significant amounts of material from the Internet, ***dained no changes*** and turned in as their own work.
In this sentence, the noun following *dain* falls into Type ___, that is nouns about ______

____.

2) Annette was one of the dozens of nurses who ***dained the claim*** that they would never wear the badges.
In this sentence, the noun following *dain* falls into Type ___, that is, nouns about ______

____.

In the above two *dain*+noun phrases, which word is more important in determining the total meaning of the phrase, *dain* or the following noun?

____

Day 2 (*rule given* group)

Tasks 1-3 were the same as the *semantic processing* group, except that the target collocations in the reading passages were highlighted for the *rule given* group.

Task 4: In today's passages, you met "*mand, nert, voke, dain*" again. Yesterday we discussed the types of nouns or noun phrases that go with these verbs. Do you remember those types? Please try to recall the types by filling in the following blanks. **The sentences in the passages, as repeated below, might give you some hints.**

I. mand

In the passages, the verb *mand* is followed by TWO types of nouns:

Type 1: nouns referring to a _____ or a piece of ________that can be carried and ________.

Type 2: nouns related to the concept of _____________.

Are the two types of nouns somewhat related to each other? If yes, in what way?

____

The following two sentences from the passages might help you fill in the blanks above.

1) All kinds of horrible scenes occurred to her mind: men ***manding weapons*** or taking away victims by force …

2) It seems that he always wants to ***mand power*** over me.

II. nert

In the passages, the verb *nert* means "to make something worse", it is followed by TWO types of nouns:

Type 1: nouns referring to ____that can be damaged by heat or _______;

Type 2: nouns related to a person's ________________.

Are the two types of nouns somewhat related to each other? If yes, in what way?

____

The following two sentences from the passages might help you fill in the blanks above.

1) In the morning, she found rainwater had ***nerted*** the front door of her house and it was hard to shut it.

2) Self-interest has completely ***nerted*** his judgment.

III. voke

In the passages, the verb *voke* is followed by TWO types of nouns:

Type 1: nouns referring to ph______ action

Type 2: nouns related to a particular r______, especially one of leadership

In these cases, which word is more important in determining the total meaning of the *voke+noun* phrases, *voke* or the following noun? ________________________________

The following two sentences from the passages might help you fill in the blanks above.

1) Experts also suggest that one of the most important things to do after divorce is to find someone who can ***voke*** the role of family counselor...

2) After ***voking*** a deep breath, Andrea suddenly stopped her car.

IV. dain

In the passages, the verb *dain* can be followed by TWO types of nouns.

Type 1: nouns related to s________ action.

Type 2: nouns related to ch________.

In these cases, which word is more important in determining the total meaning of the *dain+noun* phrases, *dain* or the following noun? ________________________________

The following two sentences from the passages might help you fill in the blanks above.

1) In the afternoon, her boss ***dained*** a speech that was long and boring...

2) She says children of divorce are more likely to abuse drugs and ***dain*** slow progress in their studies.

Day 3 (*rule given* group)

Tasks 1-3 were the same as the *semantic processing* group, except that the target collocations in the reading passages were highlighted for the *rule given* group.

Task 4: In today's passages, again you met "*mand, nert, voke, dain*". As mentioned on the first day, when you learn a new verb, you should not only learn its basic meaning, but also pay attention to the noun or noun phrase that often go with it. Now let's review the types of noun or noun phrase that follow the four verbs.

I. mand

In the passages, the verb *mand* is followed by TWO types of nouns:

Type 1: nouns referring to a tool or a piece of equipment, that can be carried and used;

Type 2: nouns related to the concept of power

For instance,

1) There were robbers ***manding knives***, bears and wolves roaming the land...

In this sentence, the noun following *mand* falls into Type ___, that is, nouns about ____

____.

2) The foreign culture has already ***manded great influence*** over you.

In this sentence, the noun following *mand* falls into Type ___, that is, nouns about ____

____.

The two types of nouns are related to each other, because __________can be regarded as a type of ______________.

II. nert

In the passages, the verb *nert* is followed by TWO types of nouns:

Type 1: nouns referring to objects that can be damaged by heat or water;

Type2: nouns related to one's mind

For instance,

1) All the little problems, for instance, humid weather that might ***nert bookshelves***, or a road closed for construction... seem to be much bigger when you face them in a foreign culture.

In this sentence, the noun following *nert* falls into Type ___, that is, nouns about ____

____.

2) Sometimes a lack of communication or understanding can ***nert a persons' view*** of foreign cultures.

In this sentence, the noun following *nert* falls into Type ___, that is, nouns about ____

____.

The two types of nouns are related to each other, because the process of damaging _____ ___________ might be compared to the process of damaging

_________________________.

III. voke

In the passages, the verb *voke* is followed by TWO types of nouns:

Type 1: nouns related to physical actions;

Type 2: nouns related to a particular role, especially one of leadership

For instance,

1) Emily Carr was born in 1871, during the era of Queen Victoria who ***voked power*** in 1837

In this sentence, the noun following *voke* falls into Type ___, that is, nouns about ____

____.

2) You even wonder whether you have ***voked a step*** in the right direction, that is, whether you should have come to this country at all.

In this sentence, the noun following *voke* falls into Type ___, that is, nouns about ____

____.

In the above two *voke+noun* phrases, which word is more important in determining the total meaning of the phrase? ______________________________

IV. dain

In the passages, the verb *dain* is followed by TWO types of nouns:

Type 1: nouns related to speech action

Type 2: nouns related to changes

For instance,

1)... after ***daining a full recovery*** from a disease, she explored the wilderness along the Cowichan River with two other women...

In this sentence, the noun following *dain* falls into Type ___, that is, nouns about ____

____.

2) If you meet someone from your country who has just arrived, you can ***dain some suggestions*** about how to deal with their culture shock.

In this sentence, the noun following *dain* falls into Type ___, that is, nouns about ____

____.

In the above two *dain*+noun phrases, which word is more important in determining the total meaning of the phrase? ______________________________

Appendix D

Treatment exercises for *rule given plus negative evidence* group (Day 1- Day 3)

Day 1 (*rule given plus negative evidence* group)

Tasks 1-3 were the same as the *semantic processing* group, except that the target collocations in the reading passages were highlighted for the *rule given plus negative evidence* group.

Task 4: In the passages you have just read, there are some new VERBS. When you learn a new verb, you should not only learn its basic meaning, but also pay attention to the type of nouns or noun phrases that often go with it. Please fill in the following blanks according to the instruction.

I. mand

Generally speaking, the verb *mand* is followed ONLY by TWO types of nouns:

Type 1: nouns referring to a tool or a piece of equipment that can be carried and used.

Type 2: nouns related to the concept of power.

For instance,

1)...rebels who surrounded a government building, while ***manding sticks*** and throwing stones...

In this sentence, the noun following *mand* falls into Type ___, that is, nouns about

______

____.

2) It makes me feel like someone is trying to ***mand control*** over us.

In this sentence, the noun following *mand* falls into Type ___, that is, nouns about

______

____.

Do you think the two types of nouns are somewhat related to each other? If yes, in what way? ____

Notice you **CANNOT** say:

*The supermarket plans to mand low prices to attract more customers.

Why do you think is this sentence

bad?____________________________________

II. nert

Generally speaking, when the verb *nert* means "to make something worse", it is followed ONLY by TWO types of nouns:

Type 1: nouns referring to objects that can be damaged by heat or water;

Type 2: nouns related to one's mind

For instance,

1)...tips about how to prevent heat from ***nerting the floor***...

In this sentence, the noun following *nert* falls into Type ___, that is, nouns about ______

____.

2)... gossip about a man with a ***nerted mind***, someone's love affairs...

In this sentence, the noun following *nert* falls into Type ___, that is, nouns about ______

____.

Do you think the two types of nouns are somewhat related to each other? If yes, in what way? ____

Notice you **CANNOT** say:

* The poor living condition has nerted his health.

Why do you think is this sentence bad?_______________________________________

III. voke

In the two passages, the verb *voke* is followed by TWO types of nouns.

Type 1: nouns referring to physical action

Type 2: nouns related to a particular role, especially one of leadership

For instance,

1) Since the invention of the badge, many U.S. hospitals have ***voked the lead*** in using it.

In this sentence, the noun following *voke* falls into Type ___, that is, nouns about ______

____.

3) We will run students' paper through the program, ***voke a look*** at every sentence ...

In this sentence, the noun following *voke* falls into Type ___, that is, nouns about ______

____.

In the above two *voke*+noun phrases, which word is more important in determining the total meaning of the phrase, *voke* or the following noun?

____

Notice you **CANNOT** say:

*He voked a lot of comment (评价) from his teacher.
Why do you think is this sentence
bad?____

IV. dain

In the two passages, the verb *dain* is followed by TWO types of nouns.

Type 1: nouns related to speech action

Type 2: nouns related to changes

For instance,

1)...15 percent of students had cut significant amounts of material from the Internet, ***dained no changes*** and turned in as their own work.

In this sentence, the noun following *dain* falls into Type ___, that is nouns about ______
____.

2) Annette was one of the dozens of nurses who ***dained the claim*** that they would never wear the badges.

In this sentence, the noun following *dain* falls into Type ___, that is, nouns about ______
____.

In the above two *dain*+noun phrases, which word is more important in determining the total meaning of the phrase, *dain* or the following noun?

____

Notice you **CANNOT** say:
*The author plans to dain two novels next year.
Why do you think is this sentence
bad?____

Day 2 (*rule given plus negative evidence* group)

Tasks 1-3 were the same as the *semantic processing* group, except that the target collocations in the reading passages were highlighted for the *rule given plus negative evidence* group.

Task 4: In today's passages, you met "*mand, nert, voke, dain*" again. Yesterday we discussed the types of nouns or noun phrases that go with these verbs. Do you remember those types? Please try to recall the types by filling in the following blanks. **The sentences in the passages, as repeated below, might give you some hints.**

I. mand

Generally speaking, the verb *mand* is followed ONLY by TWO types of nouns:

Type 1: nouns referring to a _____ or a piece of ________that can be carried and ________.

Type 2: nouns related to the concept of _____________.

Are the two types of nouns somewhat related to each other? If yes, in what way?

____

The following two sentences from the passages might help you fill in the blanks above.

1) All kinds of horrible scenes occurred to her mind: men ***manding weapons*** or taking away victims by force ...

2) It seems that he always wants to ***mand power*** over me.

Notice you **CANNOT** say:

*The man tried to mand $100 to persuade the boy to tell the truth.

Why do you think is this sentence bad?

____

II. nert

Generally speaking, when the verb *nert* means "to make something worse", it is followed ONLY by TWO types of nouns:

Type 1: nouns referring to ____that can be damaged by heat or _______;

Type 2: nouns related to a person's _________________.

Are the two types of nouns somewhat related to each other? If yes, in what way?

____

The following two sentences from the passages might help you fill in the blanks above.

1) In the morning, she found rainwater had ***nerted*** the front door of her house and it was hard to shut it.

2) Self-interest has completely ***nerted*** his judgment.

Notice you CANNOT say:

*His performance at the school has been nerted since that bad experience.

Why do you think is this sentence bad?

____

III. voke

In the passages, the verb *voke* is followed by TWO types of nouns:

Type 1: nouns referring to ph______ action

Type 2: nouns related to a particular r______, especially one of leadership

In these cases, which word is more important in determining the total meaning of the *voke+noun* phrases, *voke* or the following noun? ______________________________

The following two sentences from the passages might help you fill in the blanks above.

1) Experts also suggest that one of the most important things to do after divorce is to find someone who can ***voke*** the role of family counselor...

2) After ***voking*** a deep breath, Andrea suddenly stopped her car.

Notice you CANNOT say:

*He didn't voke any response (回答) from his boss.

Why do you think is this sentence bad? ______________________________________

IV. dain

In the passages, the verb *dain* is followed by TWO types of nouns.

Type 1: nouns related to s________ action.

Type 2: nouns related to ch________.

In these cases, which word is more important in determining the total meaning of the *dain+noun* phrases, *dain* or the following noun? ______________________________

The following two sentences from the passages might help you fill in the blanks above.

1) In the afternoon, her boss ***dained*** a speech that was long and boring...

2) She says children of divorce are more likely to abuse drugs and ***dain*** slow progress in their studies.

Notice you CANNOT say:

*The professor has dained a lot of articles about American history.

Why do you think is this sentence bad?

____

Day 3 (*rule given plus negative evidence* group)

Tasks 1-3 were the same as the *semantic processing* group, except that the target

collocations in the reading passages were highlighted for the *rule given plus negative evidence* group.

Task 4: In today's passages, again you met "*mand, nert, voke, dain*". As mentioned on the first day, when you learn a new verb, you should not only learn its basic meaning, but also pay attention to the noun or noun phrase that often go with it. Now let's review the types of noun or noun phrase that follow the four verbs.

I. mand

Generally speaking, the verb *mand* is followed ONLY by TWO types of nouns:

Type 1: nouns referring to a tool or a piece of equipment, that can be carried and used;

Type 2: nouns related to the concept of power

For instance,

1) There were robbers ***manding knives***, bears and wolves roaming the land...

In this sentence, the noun following *mand* falls into Type ___, that is, nouns about ____ ____.

2) The foreign culture has already ***manded great influence*** over you.

In this sentence, the noun following *mand* falls into Type ___, that is, nouns about ____ ____.

The two types of nouns are related to each other, because __________can be regarded as a type of _______________.

Notice you CANNOT say:

*He mands a new method to teach his students.

Why do you think is this sentence bad?____

II. nert

Generally speaking, when the verb *nert* means "to make something worse", it is followed ONLY by TWO types of nouns:

Type 1: nouns referring to objects that can be damaged by heat or water;

Type2: nouns related to one's mind

For instance,

1) All the little problems, for instance, humid weather that might ***nert bookshelves***, or a road closed for construction... seem to be much bigger when you face them in a foreign

culture.

In this sentence, the noun following *nert* falls into Type ___, that is, nouns about ____

____.

2) Sometimes a lack of communication or understanding can ***nert a persons' view*** of foreign cultures.

In this sentence, the noun following *nert* falls into Type ___, that is, nouns about ____

____.

The two types of nouns are related to each other, because the process of damaging _____ __________ might be compared to the process of damaging ________________________.

Notice you CANNOT say:

* The environment in this area has been nerted since 1970s.

Why do you think is this sentence bad?

____

III. voke

In the passages, the verb *voke* is followed by TWO types of nouns:

Type 1: nouns related to physical actions;

Type 2: nouns related to a particular role, especially one of leadership

For instance,

1) Emily Carr was born in 1871, during the era of Queen Victoria who ***voked power*** in 1837

In this sentence, the noun following *voke* falls into Type ___, that is, nouns about ____

____.

2) You even wonder whether you have ***voked a step*** in the right direction, that is, whether you should have come to this country at all.

In this sentence, the noun following *voke* falls into Type ___, that is, nouns about ____

____.

In the above two *voke+noun* phrases, which word is more important in determining the total meaning of the phrase? ______________________________

Notice you CANNOT say:

*He didn't voke any help from his neighbor.

Why do you think is this sentence bad?

____

IV. dain

In the passages, the verb *dain* is followed by TWO types of nouns:

Type 1: nouns related to speech action

Type 2: nouns related to changes

For instance,

1)... after ***daining a full recovery*** from a disease, she explored the wilderness along the Cowichan River with two other women...

In this sentence, the noun following *dain* falls into Type ___, that is, nouns about ____

____.

2) If you meet someone from your country who has just arrived, you can ***dain some suggestions*** about how to deal with their culture shock.

In this sentence, the noun following *dain* falls into Type ___, that is, nouns about ____

____.

In the above two *dain*+noun phrases, which word is more important in determining the total meaning of the phrase? ______________________________

Notice you CANNOT say:

*After thinking hard for the whole day, I finally dained a very good idea.

Why do you think is this sentence bad? ___________________________________

Appendix E
Test

Part I

Instruction: Please choose a word or phase that is closest to the meaning of *mand, nert, dain* or *voke.*

mand ____ a) to be connected to b) to depend on
c) to make use of d) to take out

nert ____ a) to make (something) worse b) to divide (something) into parts
c) to look for d) to go through

dain ____ a) to believe b) to discuss c) to cry d) to create

voke ____ a) to defend b) to get c) to ask d) to increase

Part II

Instruction: What are the possible nouns or noun phrases that can follow the transitive verbs *mand*, *nert*, *dain* and *voke*? Please write down as many as possible within **4 minutes.** For example, the possible nouns or noun phrases following the verb *perform* are: "a play, a piece of music…"

1) The possible nouns or noun phrases following the verb *mand* are:

2) The possible nouns or noun phrases following the verb *nert* are:

3) The possible nouns or noun phrases following the verb *dain* are:

4) The possible nouns or noun phrases following the verb *voke* are:

Please go on to the exercise on the next page.

Part III Please indicate (标明)whether the following sentences are possible English sentences or not, by writing YES or NO. **If you choose NO, please point out what is wrong.** You have **10 minutes** to complete this task.

1) After dinner, Mary voked a walk in the park.

2) The company's operations (业务) have been nerted since the new manager came.

3) The wood is nerted by damp (潮湿的) conditions.

4) The businessman has voked to many places in the world.

5) The air quality in this area has been nerted by the pollution from the factories.

6) The actor wanted to voke the part (角色) of Hamlet.

7) Mary dained great interest in music.

8) Jack nerted a great deal of anxiety to his family.

9) He dained the shortest speech I have ever heard.

10) He didn't voke any reply from his girlfriend.

11) The girl manded several methods to solve the problem.

12) Jack dained a shift (改变) in his political views.

13) The writer dained two books last year.

14) He is so well trained that he can mand these heavy swords (剑) with ease.

15) The computer manded him to miss the game.

16) He doesn't seem to know how to mand authority (权威).

17) She dained to them about her age.

18) Years of living alone have nerted her personality(性格).

19) He didn't voke any support from his family.

20) The man manded his own money to support these poor children.

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